ARMS CONTROL, NONPROLIFERATION AND DISARMAMENT STUDIES

ANNUAL REPORT TO CONGRESS 1999

U.S. DEPARTMENT OF STATE

TABLE OF CONTENTS

DEFENSE TECHNICAL INFORMATION CENTER

CHEMICAL AND BIOLOGICAL WARFARE

Achieving Nuclear, Biological, and Chemical Defense Synergy Through Integrated Land-, Air-, and Space-Based Sensors and Analysis

http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=TR_U2&search.DOC_TEXT=&search.ADNUMBER.TEXT=&search.TITLE.TEXT=&search.PERS_AUT.TEXT=&search.CORP_AUT.TEXT=&search.SRC_CODE.TEXT=&search.DESCRIPT.TEXT=%22nuclear+warfare%22&search.REP_DATE.GTEDATE=1999-01-01&search.REP_DATE.LTEDATE=1999-12-31&search.ABSTRACT.TEXT=&search.FLD_GROUPS.TEXT=&search.CONT_NUMBER.TEXT=&search.DESC_NOTE.TEXT=&search.IDENTS.TEXT=&secondorderby=&numrecords=250&fuzzy=0

Abstract: This thesis presents a concept for a near-future application of an integrated land-, air-, and space-based system of sensors, detectors, and analysis to provide critical immediate warning, reporting, and situational updates of NBC attacks. It shows how much more efficient and effective this concept is as compared to the United States' current system of independent detectors and sensors operating separately at the various levels of command and control. Ultimately, it describes a concept that has a greater potential to achieve the United States' objective of convincing our enemies that NBC weapons will be ineffective against us. The U.S. Counter-Proliferation Initiative is the overarching strategy for countering the WMD threat. It focuses on prevention of the proliferation of weapons of mass destruction, deterrence of their use, and defense measures countering use. While these three arms of the Counter- Proliferation Initiative currently exist in separate operational bodies, they have yet to be linked in a way that will combine and, consequently, strengthen their efforts. What they lack is a system that allows all three elements of this initiative to operate simultaneously and synergistically to nullify the risk or loss of personnel and material from weapons of mass destruction usage. This thesis presents a concept to achieve this critically needed synergy. This presentation is relevant to the following topics: Weapons of Mass Destruction, NBC Defense, Sensors, Detectors, Counter Proliferation, Proliferation, Space- Based Analysis, Defense Satellite Program, Space-Based Infra Red System.

Agent Orange: Actions Needed to Improve Communications of Air Force Ranch Hand Study Data and Results

http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=TR_U2&database=FT&search.DOC_TEXT=&search.ADNUMBER.TEXT=&search.TITLE.TEXT=Chemical+Agent+Disposal+&search.PERS_AUT.TEXT=&search.CORP_AUT.TEXT=&search.SRC_CODE.TEXT=&search.DESCRIPT.TEXT=&search.REP_DATE.GTEDATE=1999-01-01&search.REP_DATE.LTEDATE=1999-12-31&search.ABSTRACT.TEXT=&search.FLD_GROUPS.TEXT=&search.CONT_NUMBER.TEXT=&search.DESC_NOTE.TEXT=&search.IDENTS.TEXT=&secondorderby=&numrecords=25&fuzzy=0

Abstract: From 1962 to early 1971, the United States sprayed herbicides, including Agent Orange, over Vietnam. In the late 1970s, concerns began to emerge over the long-term

health problems of Vietnam veterans. Although these veterans could have been exposed to many potential health hazards, including pesticides, infectious diseases, and treatments for tropical diseases, attention focused on herbicides. Several herbicides, including Agent Orange, contain dioxin,1 which is known to cause a variety of adverse health effects in animals. While there is scientific evidence of some associations between exposure to herbicides (or the dioxin they contain) and adverse human health conditions, the effect of this exposure on human health remains controversial. There has been long-standing congressional interest in and concern about the effects of exposure to herbicides such as Agent Orange. Congress has held at least 26 hearings on the subject since 1978, some of them involving scrutiny of scientific studies. One key effort to examine the long-term health effects of service members' exposure to herbicides in Vietnam is an ongoing Air Force study known as the Ranch Hand study This study was designed to investigate whether exposure to herbicides in Vietnam led or would lead to adverse health. To this end, the study follows the health (morbidity) and mortality rates of the Ranch Hands-the almost 1,300 Air Force personnel who sprayed herbicides from the air in Vietnam-in contrast to those of a comparison group. This comparison group consists of Air Force military personnel who were not involved in the spraying and who were matched to the Ranch Hands in terms of age, race, and military occupation. The 25-year study, which began in 1982 and is scheduled to end in fiscal year 2006, is projected to cost over $140 million.

Analysis of BIS(2-Chloroethyl) Sulfide (HD) Stored in Ton Containers at U.S. Army Soldier Biological Chemical Command. Ton Container Stockpile Survey

http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=TR_U2&search.DOC_TEXT=&search.ADNUMBER.TEXT=&search.TITLE.TEXT=&search.PERS_AUT.TEXT=&search.CORP_AUT.TEXT=&search.SRC_CODE.TEXT=&search.DESCRIPT.TEXT=%22chemical+warfare%22&search.REP_DATE.GTEDATE=1999-01-01&search.REP_DATE.LTEDATE=1999-12-31&search.ABSTRACT.TEXT=&search.FLD_GROUPS.TEXT=&search.CONT_NUMBER.TEXT=&search.DESC_NOTE.TEXT=&search.IDENTS.TEXT=&secondorderby=&numrecords=250&fuzzy=0

Abstract: The U.S. Army has to dispose of the U.S. stockpile of chemical warfare agent, HD, contained in bulk containers at Aberdeen Proving Ground (Edgewood Area), MD. The Program Manager, Chemical Demilitarization, Alternative Technologies and Approaches, has implemented a stockpile sampling survey to characterize the chemical agent for gels and impurities to determine if laboratory-scale conditions will need to be adapted and changed to assist in destroying the agent and cleaning out ton containers (TC). Gas chromatography thermal conductivity detection (GC/TCD) and gas chromatography mass spectrometry detection (GC/MSD) were used to determine purity/impurities and to identify gels in the chemical agent. The results and information will be used in bench and pilot-scale design efforts to be incorporated into the TC clean-out, decontamination, and disposal.

Application of Capillary Electrophoresis Laser Induced Fluorescence to the Detection of Nucleic Acid Probe Fragments

http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=TR_U2&search.DOC_TEXT=&search.ADNUMBER.TEXT=&search.TITLE.TEXT=&search.PERS_AUT.TEXT=&search.CORP_AUT.TEXT=&search.SRC_CODE.TEXT=&search.DESCRIPT.TEXT=%22biological+warfare%22&search.REP_DATE.GTEDATE=1999-01-01&search.REP_DATE.LTEDATE=1999-12-31&search.ABSTRACT.TEXT=&search.FLD_GROUPS.TEXT=&search.CONT_NUMBER.TEXT=&search.DESC_NOTE.TEXT=&search.IDENTS.TEXT=&secondorderby=&numrecords=100&fuzzy=0

Abstract: The Canadian Forces require rapid, sensitive systems for identification of bacterial and viral biological warfare (BW) agents in environmental matrices such as air and water. The system must detect BW agents at extremely low concentrations with no false alarms and operate under battlefield conditions. Gene probes can be used to target signature sequences of BW agents for identification; Cycling Probe Technology (CPT(Trademark)) is a gene probe identification technique based on the use of target nucleic acid as a catalyst for the conversion of chimeric probe molecules to detectable products. Capillary zone electrophoresis with laser induced fluorescent detection (CE-LIF) is an attractive technology for the detection of nucleic acid fragments because of its ultra-low detection limits and relatively simple instrument design. Together, CE-LIP detection of gene probe fragments offers the potential for developing a sensitive BW agent identification capability. In this work, a chimeric 5' (DNA)8(RNA)4(DNA)16 3' probe for Bacillus globigii; an anthrax simulant, designated as DPES2A, was used. In a typical experiment , the 5' fluoresceinated DRES2A probe (10 fmoles/ micro-L) and synthetic target DNA (10(exp -4) - (10(exp -7) pmoles/micro-L) were incubated at 65 deg C for 30 min in the presence of RNase H. A 1:10 dilution of CPT reaction mixture was then analyzed by CE-LIP. The intact probe and cleaved 5' fluoresceinated-DNA product(s) were separated and detected using a Beckman P/ACE 5010 CE-LIP (ssDNA gel column, 7 cm L(sub d)) in under 5 minutes. As low as lattomole of target DNA in the CPT probe assay could be detected. This work demonstrates that CE-LIP can be used to separate and detect the products of the CPT assay and that CE-LIP can be a sensitive method for the detection of nucleic acid fragments.

Audit Report. Tooele Chemical Agent Disposal Facility Preparation for Year 2000

http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=TR_U2&database=FT&search.DOC_TEXT=&search.ADNUMBER.TEXT=&search.TITLE.TEXT=Chemical+Agent+Disposal+&search.PERS_AUT.TEXT=&search.CORP_AUT.TEXT=&search.SRC_CODE.TEXT=&search.DESCRIPT.TEXT=&search.REP_DATE.GTEDATE=1999-01-01&search.REP_DATE.LTEDATE=1999-12-31&search.ABSTRACT.TEXT=&search.FLD_GROUPS.TEXT=&search.CONT_NUMBER.TEXT=&search.DESC_NOTE.TEXT=&search.IDENTS.TEXT=&secondorderby=&numrecords=25&fuzzy=0

Abstract: This is one in a series of reports being issued by the Inspector General, DoD, in accordance with an informal partnership with the Chief Information Officer, DoD, to monitor DoD efforts in addressing the year 2000 computing problem. For a listing of audit projects addressing the issue, see the year 2000 webpage on the IGnet at http :?www.ignet. gov. The overall audit objective determined whether the Project Manager

for Chemical Stockpile Disposal at the Tooele Chemical Agent Disposal Facility was adequately preparing information technology systems to resolve date-processing issues regarding the year 2000 computing problem. Specifically, the audit determined whether the Project Manager at the Tooele Chemical Agent Disposal Facility compiled with the DoD Year 2000 Management Plan.

Biological Warfare: Are U. S. Armed Forces Ready for Biological Warfare

http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=TR_U2&search.DOC_TEXT=&search.ADNUMBER.TEXT=&search.TITLE.TEXT=&search.PERS_AUT.TEXT=&search.CORP_AUT.TEXT=&search.SRC_CODE.TEXT=&search.DESCRIPT.TEXT=%22biological+warfare%22&search.REP_DATE.GTEDATE=1999-01-01&search.REP_DATE.LTEDATE=1999-12-03&search.ABSTRACT.TEXT=&search.FLD_GROUPS.TEXT=&search.CONT_NUMBER.TEXT=&search.DESC_NOTE.TEXT=&search.IDENTS.TEXT=&secondorderby=&numrecords=100&fuzzy=0

Abstract: This monograph illustrates the historical significance of biological warfare (BW), current and near term status of the BW threat, and the United States' current and near term level of defense readiness to counter this threat. It then compares the threat to the level of defense readiness to assess whether the defense readiness is adequate to meet the current threat. It then discusses what near and long-term actions the United States needs to implement to correct the shortfalls. The monograph's underlying assumption is that when the United States develops the capability to deny or limit the effects of an enemy BW attack and can he combined with a devastatingly disproportional retaliation, then enemy BW use will become ineffective and the threat of its use will proportionately decline. The past decade has witnessed a major shift in the nature and magnitude of the threat posed by biological weapons. For many years, the dangers of such weapons arose solely from the risk of their use in international conflicts. As a result, the class of potential users consisted entirely of a small number of industrialized countries that had developed (or could develop) a biological arsenal for use in warfare. This threat has now changed. In the last 10 years, the class of potential users has expanded to include a growing number of developing nations and a wide range of nonstate actors such as terrorist groups, religious cults, and individuals. Furthermore, many of these new parties now pose a threat of an entirely different kind--the use of biological weapons as agents of terror rather than as instruments of war. Over the past few years, the United States research and development efforts have made progress in vaccines and promising BW detection systems. However, the U.S. only vaccinates a portion of its defense force against a select few biological agents. Furthermore, its current number of detection devices only detect biological attacks that are in progress.

Canadian Participation in the 1998 NATO/Poland Chemical Warfare Agent Sampling Demonstration

http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=TR_U2&search.DOC_TEXT=&search.ADNUMBER.TEXT=&search.TITLE.TEXT=&search.PERS_AUT.TEXT=&search.CORP_AUT.TEXT=&search.SRC_CODE.TEXT=&search.DESCRIPT.TEXT=%22biological+warfare%22&search.REP_DATE.GTEDATE=1999-01-01&search.REP_DATE.LTEDATE=1999-12-

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Abstract: Between 1-3 September 1998, Canada participated in two NATO Sampling and Identification of Chemical Agents (SICA) demonstrations. SICA teams from 9 NATO as well as a team from Poland participated in the demonstrations. The first demonstration was conducted using a chemical warfare (CW) simulant, while the second demonstration was conducted with the CW agent, mustard. The CW agent sampling demonstrations were valuable, not only from a scientific viewpoint, but also for raising the profile of SICA within the military. The sampling demonstrations afforded the NATO countries an opportunity to implement the lessons learned from the successful field trials held in France in 1997. Within the NATO context, the major issue arising from the sampling demonstrations was the collection of samples as legal evidence. The prime reason for the sampling and identification of biological and chemical agents is to confirm use by the enemy and thereby support timely decisions concerning the NATO response to such actions. Subsequently, NATO may decide to turn the evidence of a CB attack over to the legal system. In such cases, the sampling and identification process must be able to stand up under legal examination. Alternatively, if this information is required solely for the use of the military, then the requirements may be somewhat less rigorous.

Catalysis by Polymer Latexes and Dendrimers

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Abstract: Polymer latexes and dendrimers have been synthesized and tested as catalysts for basic hydrolysis of CW simulants. The latexes were made from methacrylic esters or styrene and functional monomers, and they contained quaternary ammonium groups as ion exchange sites for reagents, such as hydroxide ion, and catalysts, such as o-iodosobenzoate ion (IBA). By use of an ion exchange model for the kinetics, the rates of hydrolysis of p-nitrophenyl esters in the latexes were shown to depend mainly on the ability of the latex to sorb the organic reactant from water. The catalysts were active for hydrolysis of organophosphates in aqueous NaOH at phosphate concentrations as high as 0.25 M. Latexes that were stable in the presence of high concentrations of electrolytes were created by use of a poly(ethylene oxide)-containing monomer and by copolymer modifications leading to cross-linked polyampholytes. The polyampholytes were stable indefinitely and were catalytically active even in 4 M NaCl solution. Metal complexes of poly(propylene imine) dendrimers were weakly active catalysts for the hydrolyses of p-nitrophenyl diphenyl phosphate and of bis(p-nitrophenyl phosphate). A new family of dendrimers having alternating amine and ether generations was synthesized. Poly (propylene imine) dendrimers having 8,32, and 64 primary amine end groups were converted to tertiary amines and to a variety of quaternary ammonium salts. Some had

both hydrophobic octyl and hydrophilic triethylene glycol methyl ether chains on each end. Applications of the new dendrimers to catalysis are planned.

Charging Ahead into the Next Millennium: Proceedings of the Systems and Technology Symposium (20th) Held in Denver, Colorado on 7-10 June 1999

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Abstract not available on this web site.

Chemical Agent Accountability Program of the U.S. Army Edgewood Chemical Biological Center

http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=TR_U2&database=FT&search.DOC_TEXT=&search.ADNUMBER.TEXT=&search.TITLE.TEXT=Chemical+Agent+Disposal+&search.PERS_AUT.TEXT=&search.CORP_AUT.TEXT=&search.SRC_CODE.TEXT=&search.DESCRIPT.TEXT=&search.REP_DATE.GTEDATE=1999-01-01&search.REP_DATE.LTEDATE=1999-12-31&search.ABSTRACT.TEXT=&search.FLD_GROUPS.TEXT=&search.CONT_NUMBER.TEXT=&search.DESC_NOTE.TEXT=&search.IDENTS.TEXT=&secondorderby=&numrecords=25&fuzzy=0

Abstract: This publication was designed to be an easy to use handbook for implementing the Chemical Agent Accountability Program.

Chemical and Biological Defense: Chemical Stockpile Emergency Preparedness Program for Oregon and Washington

http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=TR_U2&database=FT&search.DOC_TEXT=&search.ADNUMBER.TEXT=&search.TITLE.TEXT=Chemical+Agent+Disposal+&search.PERS_AUT.TEXT=&search.CORP_AUT.TEXT=&search.SRC_CODE.TEXT=&search.DESCRIPT.TEXT=&search.REP_DATE.GTEDATE=1999-01-01&search.REP_DATE.LTEDATE=1999-12-31&search.ABSTRACT.TEXT=&search.FLD_GROUPS.TEXT=&search.CONT_NUMBER.TEXT=&search.DESC_NOTE.TEXT=&search.IDENTS.TEXT=&secondorderby=&numrecords=25&fuzzy=0

Abstract: As you requested, we reviewed the Chemical Stockpile Emergency Preparedness Program (CSEPP) for the Oregon and Washington communities surrounding the Umatilla Chemical Depot. This program was created to protect the public in the event of an accident during destruction of the chemical weapons stockpile. You wanted to know whether the communities around the depot have made progress since our 1997 report in preparing for a chemical stockpile emergency and any key steps they could take to further their progress. Specifically, this report (1) discusses the progress communities have made since our 1997 report on their Chemical Stockpile Emergency

Preparedness Program efforts and (2) identifies strategies for enhancing the program's implementation in Oregon.

Chemical and Biological Defense: Coordination of Nonmedical Chemical and Biological R&D Programs

http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=TR_U2&search.DOC_TEXT=&search.ADNUMBER.TEXT=&search.TITLE.TEXT=&search.PERS_AUT.TEXT=&search.CORP_AUT.TEXT=&search.SRC_CODE.TEXT=&search.DESCRIPT.TEXT=%22biological+warfare%22&search.REP_DATE.GTEDATE=1999-01-01&search.REP_DATE.LTEDATE=1999-12-31&search.ABSTRACT.TEXT=&search.FLD_GROUPS.TEXT=&search.CONT_NUMBER.TEXT=&search.DESC_NOTE.TEXT=&search.IDENTS.TEXT=&secondorderby=&numrecords=100&fuzzy=0

Abstract: In response to your request, we examined the coordination of federal R&D efforts to develop nonmedical technology related to CB defense. Specifically, we (1) identified federal programs that conduct nonmedical CB defense-related R&D and (2) described the existing mechanisms for coordinating these programs. A companion report, Chemical and Biological Defense: Program Planning and Evaluation Should Follow Results Act Framework (GAO/NSIAD-99-159, Aug. 16, 1999), examines the extent of DOD's application of the Government Performance and Results Act's outcome-oriented principles to the CB Defense Program.

Chemical and Biological Defense of Ports of Debarkation: What Actions Are Being Taken and How Effective Are They?

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Abstract: Operation Desert Shield displayed to the world what the U.S. and allied coalition forces could do given six months to flow combat power into ports unopposed. Recent studies commissioned by the Joint Staff concluded that the U.S. military will not have that luxury in the future. This conclusion compels the U.S. to reevaluate its airport and seaport of debarkation (APOD, SPOD) chemical and biological (CB) defense and consequence management strategy. Military analysts believe that a CB strike on the PODs will not rule out U.S. victory as long as the U.S. is willing to endure a prolonged conflict with significant casualties. This study explains the process needed to avoid paying this unnecessary price. An enemy CB attack on a POD during force projection presents a complex situation that demands significant advance preparation. The CB threat comes in many forms and the threat analysis process must be modified to identify each one. Only then can vulnerabilities be accurately assessed and mitigated. The current battlefield vulnerability analysis process, if applied to PODs, would result in a grossly inaccurate effect analysis. Defending against and recovering from a CB attack in the

PODs are paramount for the preservation of U.S. strategy and the lives of U.S. service personnel.

Chemical and Biological Defense: Program Planning and Evaluation Should Follow Results Act Framework

http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=TR_U2&search.DOC_TEXT=&search.ADNUMBER.TEXT=&search.TITLE.TEXT=&search.PERS_AUT.TEXT=&search.CORP_AUT.TEXT=&search.SRC_CODE.TEXT=&search.DESCRIPT.TEXT=%22biological+warfare%22&search.REP_DATE.GTEDATE=1999-01-01&search.REP_DATE.LTEDATE=1999-12-31&search.ABSTRACT.TEXT=&search.FLD_GROUPS.TEXT=&search.CONT_NUMBER.TEXT=&search.DESC_NOTE.TEXT=&search.IDENTS.TEXT=&secondorderby=&numrecords=100&fuzzy=0

Abstract: As you requested, we examined the extent to which DOD has applied the Results Act's outcome-oriented principles to the CB Defense Program, focusing in particular on research, development, testing, and evaluation (RDT&E) activities that lead to new technologies and defensive capabilities. Specifically, we assessed whether (1) CB Defense Program goals are explicit and measurable, (2) the CB Defense Program has performance measures that assess outcomes and impacts rather than outputs and activities, and (3) organizations executing the CB defense RDT&E activities have incorporated Results Act principles in their program planning and evaluation. A companion report Chemical and Biological Defense: Coordination of Nonmedical Chemical and Biological Research and Development Programs (GAO/NSIAD-99-160, Aug. 16, 1999) examines coordination on nonmedical CB defense research and development programs.

Chemical and Biological Warfare: Impact on Force Deployment

http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=TR_U2&search.DOC_TEXT=&search.ADNUMBER.TEXT=&search.TITLE.TEXT=&search.PERS_AUT.TEXT=&search.CORP_AUT.TEXT=&search.SRC_CODE.TEXT=&search.DESCRIPT.TEXT=%22biological+warfare%22&search.REP_DATE.GTEDATE=1999-01-01&search.REP_DATE.LTEDATE=1999-12-31&search.ABSTRACT.TEXT=&search.FLD_GROUPS.TEXT=&search.CONT_NUMBER.TEXT=&search.DESC_NOTE.TEXT=&search.IDENTS.TEXT=&secondorderby=&numrecords=100&fuzzy=0

Abstract: One of the seven principles of logistics identified in Joint Pub 4-0 is survivability or the capacity to prevail in the face of potential destruction. Civilian personnel who make the force deployment system function are high pay-off targets subject to chemical and biological warfare (CBW). Disrupting or deterring the United States ability to deploy forces can seriously undermine the CINC's ability to prosecute the mission. Assured availability of critical host nation, civilian, and contractor personnel is a significant feature in designing a "survivable" force deployment system. Consequently, providing CBW protection should be a priority for the CWC. Operational Commanders are likely to see a growing reliance on host nation and contractor support particularly in the theater distribution process. Greater reliance does not come, however, without risks and costs. Vulnerabilities in our force deployment system due to our current dependence on a non-military workforce presents the operational commander with significant

challenges and a need to understand the requirements to provide chemical and biological protection to our host nation and civilian personnel.

Chemical Warfare Agent Decontamination Solution

http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=TR_U2&search.DOC_TEXT=&search.ADNUMBER.TEXT=&search.TITLE.TEXT=&search.PERS_AUT.TEXT=&search.CORP_AUT.TEXT=&search.SRC_CODE.TEXT=&search.DESCRIPT.TEXT=%22chemical+warfare%22&search.REP_DATE.GTEDATE=1999-01-01&search.REP_DATE.LTEDATE=1999-12-31&search.ABSTRACT.TEXT=&search.FLD_GROUPS.TEXT=&search.CONT_NUMBER.TEXT=&search.DESC_NOTE.TEXT=&search.IDENTS.TEXT=&secondorderby=&numrecords=250&fuzzy=0

Abstract: A chemical warfare agent decontamination solution made up of about 20% of a quaternary ammonium complex containing benzyltrimethylammonium chloride and benzyltriethylammonium chloride and about 20% by weight of an oxidizer, dissolved in a solvent, such as water or glycol, is provided. This solution is a noncorrosive, nontoxic, nonflammable decontaminant, which may also be used to neutralized organophosphorus agricultural chemicals.

Chemical Weapons Treaty Technologies Reference Collection – 1997 Supplement

http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=TR_U2&search.DOC_TEXT=&search.ADNUMBER.TEXT=&search.TITLE.TEXT=&search.PERS_AUT.TEXT=&search.CORP_AUT.TEXT=&search.SRC_CODE.TEXT=&search.DESCRIPT.TEXT=%22biological+warfare%22&search.REP_DATE.GTEDATE=1999-01-01&search.REP_DATE.LTEDATE=1999-12-31&search.ABSTRACT.TEXT=&search.FLD_GROUPS.TEXT=&search.CONT_NUMBER.TEXT=&search.DESC_NOTE.TEXT=&search.IDENTS.TEXT=&secondorderby=&numrecords=100&fuzzy=0

Abstract: The Chemical Weapons Treaty Technologies Reference Collection serves as a resource for government agencies and other investigators interested in CW treaty verification technologies. It includes an extensive array of documents from national and international sources including government research centers, laboratories, treaty organizations, universities, foundations, private industry, and the open literature. Two volumes of this reference collection were completed in March 1995. Volume 1 is a Bibliography and Volume 2 is a Keyword Index. The 1998 Supplement contains 684 additions and numerous updates to this two volume set. Within this supplement is an alphabetical index of treaty documents (ordered by author or by title), and an index of documents in the Chemical Warfare/Chemical and Biological Defense Information Analysis Center (CBIAC) accession Number order with a keyword index. Instructions for gaining access to the Bibliographic Database (CBIAD BD) is provided.

Combating Domestic Terrorism: Our National Security Priority?

http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=TR_U2&search.DOC_TEXT=&search.ADNUMBER.TEXT=&search.TITLE.TEXT=&search.PERS_AUT.TEXT=&search.CORP_AUT.TEXT=&search.SRC_CODE.TEXT=&search.DESCRIPT.TEXT=%22strategic%22&search.REP_DATE.GTEDATE=1999-01-01&search.REP_DATE.LTEDATE=1999-12-

03&search.ABSTRACT.TEXT=&search.FLD_GROUPS.TEXT=&search.CONT_NUMBER.TEXT=&search.DESC_NOTE.TEXT=&search.IDENTS.TEXT=&secondorderby=&numrecords=100&fuzzy=0

Abstract: As we approach the 21st century, as the superpower nation of the world, the United States must be prepared to combat the emerging threat of domestic terrorism, a threat that will be employed by both international and domestic terrorist organizations. In anticipation of this, our response to domestic terrorism must incorporate a positive, proactive, and comprehensive program that identifies terrorist organizations and their threat capability, prevents them from committing attacks if possible, yet allows us to respond in a prepared manner, once an attack has occurred. This can be accomplished with an effective counter-terrorism policy that addresses both offensive and defensive measures. This project will focus on terrorist, our efforts to counter terrorist activities, their threat capability, our response, both military and civilian, as well as preparedness. Hopefully we can answer, "Are we really where we need to be, and if not what must we do to get there?"

Combating Terrorism: Need for Comprehensive Threat and Risk Assessments of Chemical and Biological Attacks

http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=TR_U2&search.DOC_TEXT=&search.ADNUMBER.TEXT=&search.TITLE.TEXT=&search.PERS_AUT.TEXT=&search.CORP_AUT.TEXT=&search.SRC_CODE.TEXT=&search.DESCRIPT.TEXT=%22chemical+warfare%22&search.REP_DATE.GTEDATE=1999-01-01&search.REP_DATE.LTEDATE=1999-12-31&search.ABSTRACT.TEXT=&search.FLD_GROUPS.TEXT=&search.CONT_NUMBER.TEXT=&search.DESC_NOTE.TEXT=&search.IDENTS.TEXT=&secondorderby=&numrecords=250&fuzzy=0

Abstract: Chemical and biological experts and intelligence agency officials believe that the ease or difficulty for terrorists to cause mass casualties with an improvised chemical or biological weapon or device depends on the chemical or biological agent selected. Experts from the scientific, intelligence, and law enforcement communities told us that terrorists do not need sophisticated knowledge or dissemination methods to use toxic industrial chemicals such as chlorine. In contrast, terrorists would need a relatively high degree of sophistication to successfully cause mass casualties with some other chemical and most biological agents. Specialized knowledge would be needed to acquire the right biological agent or precursor chemicals, process the chemical or biological agent, improvise a weapon or device, and effectively disseminate the agent to cause mass casualties.

Combating Terrorism: Observations on Growth in Federal Programs

http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=TR_U2&search.DOC_TEXT=&search.ADNUMBER.TEXT=&search.TITLE.TEXT=&search.PERS_AUT.TEXT=&search.CORP_AUT.TEXT=&search.SRC_CODE.TEXT=&search.DESCRIPT.TEXT=%22biological+warfare%22&search.REP_DATE.GTEDATE=1999-01-01&search.REP_DATE.LTEDATE=1999-12-31&search.ABSTRACT.TEXT=&search.FLD_GROUPS.TEXT=&search.CONT_NUMBER.TEXT=&search.DESC_NOTE.TEXT=&search.IDENTS.TEXT=&secondorderby=&numrecords=100&fuzzy=0

Abstract: U.S. intelligence agencies continuously assess both the foreign and domestic terrorist threat to the United States and note that conventional explosives and firearms continue to be the weapons of choice for terrorists. Terrorists are less likely to use chemical and biological weapons than conventional explosives, although the possibility that they may use chemical and biological materials may increase over the next decade, according to intelligence agencies. Agency officials have noted that terrorist use of nuclear weapons is the least likely scenario, although the consequences could be disastrous.

Dendritic Polymers: A New Class of Polymers for Decontamination and Detection of Chemical and Biological Warfare Agents

http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=TR_U2&search.DOC_TEXT=&search.ADNUMBER.TEXT=&search.TITLE.TEXT=&search.PERS_AUT.TEXT=&search.CORP_AUT.TEXT=&search.SRC_CODE.TEXT=&search.DESCRIPT.TEXT=%22chemical+warfare%22&search.REP_DATE.GTEDATE=1999-01-01&search.REP_DATE.LTEDATE=1999-12-31&search.ABSTRACT.TEXT=&search.FLD_GROUPS.TEXT=&search.CONT_NUMBER.TEXT=&search.DESC_NOTE.TEXT=&search.IDENTS.TEXT=&secondorderby=&numrecords=250&fuzzy=0

Abstract: Our program has focused on the use of dendritic polymers as potential enhancers of biodetection or biosensor schemes for the detection of analytes such as biological warfare agents. Dendritic polymers exhibit a new macromolecular architecture, and novel properties as well, when compared to conventional polymers such as linear polymers. The aim was to see if we could utilize these new polymers for improved design of biosensors. To this end we investigated the utility of attaching antibodies to a solid phase (such as a QCM device) via polyamidoamine (PAMAM) dendrimers in an effort to improve parameters such as sensitivity in immunoassays. Clinical diagnostic assays in the commercial sector have successfully incoroporated these polymers for improved performance, and we chose to see if similar advantages could be translated to alternative transducers such as a QCM device. In addition, preliminary investigations were initiated in which PAMAM dendrimers are used as chemical amplifiers in biosensors in which detection is done colorimetrically via the naked eye. We also began to investigate immunoreactions and dendrimer-enhanced immunoprecipitations in capillaries as an alternate platform for a biodetection device.

Department of Defense Nuclear/Biological/Chemical (NBC) Defense. Annual Report to Congress

http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=TR_U2&search.DOC_TEXT=&search.ADNUMBER.TEXT=&search.TITLE.TEXT=&search.PERS_AUT.TEXT=&search.CORP_AUT.TEXT=&search.SRC_CODE.TEXT=&search.DESCRIPT.TEXT=%22nuclear%22&search.REP_DATE.GTEDATE=1999-01-01&search.REP_DATE.LTEDATE=1999-12-03&search.ABSTRACT.TEXT=&search.FLD_GROUPS.TEXT=&search.CONT_NUMBER.TEXT=&search.DESC_NOTE.TEXT=&search.IDENTS.TEXT=&secondorderby=&numrecords=100&fuzzy=0

Abstract: The objective of the Department of Defense (DoD) Chemical and Biological Defense Program (CBDP) is to enable our forces to survive, fight, and win in a

chemically or biologically contaminated warfare environment. The DoD CBDP provides development and procurement of systems to enhance the ability of U.S. forces to deter and defend against CB agents during regional contingencies. The probability of U.S. forces encountering CB agents during worldwide conflicts remains high. An effective defense reduces the probability of a CB attack, and if an attack occurs, it enables U.S. forces to survive, continue operations, and win. Scientific, technological, and resource limitations remain in preventing U. S. forces from having complete full dimensional protection and meeting all requirements for two nearly simultaneous Major Theater Wars. The unique physical, toxicological, destructive, and other properties of each threat requires that operational and technological responses be tailored to the threat. Nevertheless, significant progress has been made in overcoming these limitations since the establishment of the DoD CBDP. Still, U.S. forces remain the best protected forces in the world for surviving and conducting operations in chemically or biologically contaminated environments.

The DTIC Review: Bioterrorism: A Grim Reality. Volume 4, Number 3, January 1999

http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=TR_U2&search.DOC_TEXT=&search.ADNUMBER.TEXT=&search.TITLE.TEXT=&search.PERS_AUT.TEXT=&search.CORP_AUT.TEXT=&search.SRC_CODE.TEXT=&search.DESCRIPT.TEXT=%22biological+warfare%22&search.REP_DATE.GTEDATE=1999-01-01&search.REP_DATE.LTEDATE=1999-12-31&search.ABSTRACT.TEXT=&search.FLD_GROUPS.TEXT=&search.CONT_NUMBER.TEXT=&search.DESC_NOTE.TEXT=&search.IDENTS.TEXT=&secondorderby=&numrecords=100&fuzzy=0

Abstract: Biological warfare is the use of disease to barm or kill an adversary's military forces, population, food, and livestock. This includes any living (or non-living virus) microorganism or bioactive substance that is produced by a microorganism that can be delivered by conventional warhead or even civilian means. Biological warfare is distinguished not only by its mode of killing, but also by the potential scale of destruction associated with the disease. The fact that biological weapons have fallen into the hands of terrorist groups is well known. A terrorist attack using biological agents is known as bioterrorism. There are a huge variety of adapted bacteria and viruses that could be used as biological weapons, but one of the most common types today is Anthrax, the original biological warfare agent. This issue of The DTIC Review "Bioterrorism: A Grim Reality" offers readers at all levels information on the impending threat of bioterrorism.

Dynamic Targeting and the Mobile Missile Threat

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Abstract: The worldwide proliferation of mobile theater ballistic missiles, and alarming growth of chemical and biological weapons programs, dramatically increases the likelihood that U.S. forces will face this critical threat on future battlefields. The Coalition's failed efforts to thwart Saddam Hussein's use of the mobile Scud missile in the 1991 Gulf War provide some salient lessons for today's Joint Force Commander. Technological advances in U.S. sensors and munitions indicate a significant increase in our ability to locate, track and destroy time sensitive, mobile targets. Emerging operational concepts like Dynamic Targeting, Dynamic Battle Management, and the Rapid Targeting System hold great promise for near real time tasking that will enable assets to consistently operate inside an opponent's decision cycle. Technological superiority alone, however, will not guarantee success against a mobile missile force on today's battlefield. Successful Attack Operations, using joint air power, will require a level of effort and doctrinal approach that is ill defined in contemporary joint publications. The Joint Force Commander must carefully consider threat capabilities and air power employment options, when apportioning limited theater air assets for emergent dynamic targeting. The synergistic effects of technology and doctrine, in concert with the requisite allocation of airborne assets will provide the Joint Force Commander with the most effective counter to the mobile missile threat.

Expression and Purification of Selenomethionyl Prolidase from Alteromonas spJD6.5

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Abstract: Prolidase from Alteromonas spJD6.5 catalytically hydrolyzes a variety of 6-type CW nerve agents at a significant rate. However, this enzyme fails to hydrolyze V-type CW nerve agents. Logic-based design to obtain enzyme variants with novel catalytic capabilities in prolidase is the long-term objective of our goal. Elucidation of the three dimensional structure of prolidase is a key prerequisite to undertake this study. As a first step towards this goal, selenium-tagged prolidase was produced to initiate the structural studies of prolidase. Purification and characterization results of selenomethionyl prolidase are summarized in this report.

Five Year Follow-up of Army Personnel Potentially Exposed to Chemical Warfare Agents Descriptive Note: Annual Report, 1 Jun 1998-31 May 1999

http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=TR_U2&database=FT&search.DOC_TEXT=&search.ADNUMBER.TEXT=&search.TITLE.TEXT=CW+nerve+agents&search.PERS_AUT.TEXT=&search.CORP_AUT.TEXT=&search.SRC_CODE.TEXT=&search.DESCRIPT.TEXT=&search.REP_DATE.GTEDATE=1999-01-01&search.REP_DATE.LTEDATE=1999-12-31&search.ABSTRACT.TEXT=&search.FLD_GROUPS.TEXT=&search.CONT_NUMBER.TEXT=&search.DESC_NOTE.TEXT=&search.IDENTS.TEXT=&secondorderby=&numrecords=25&fuzzy=0

Abstract: This is an epidemiologic study of morbidity and mortality outcomes associated with potential exposure to low levels of chemical warfare agents at the Khamisiyah ammunition depot in southeastern Iraq. Health outcomes of troops putatively exposed during rocket demolition in 1991 will be compared to those of a similar group of unexposed military personnel for a minimum five-year follow- up period. Exposure levels will be estimated based on environmental and climatological modeling of the chemical footprint, in combination with troop location data during the time of the demolition. Specific objectives of the study are: (1) to compare morbidity and mortality outcome rates among Army personnel putatively exposed to chemical warfare agents and those not exposed using both self-reported health information and passive records-based methods; and (2) to compare temporal trends in health perception and health care use before and after notification of potential chemical warfare agent exposure among the putatively exposed and unexposed groups.

Future NATO Peace Operations - The Way Ahead

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Abstract: As the United Nations and its members look at the uneven record of post-Cold War peacekeeping operations and at the challenges of peacekeeping in the future, their problems are compounded by the dramatic reductions in the armed forces of most of the usual troop-contributing countries. In addition, training for the wide variety of tasks now involved in peace operations conflicts with the training necessary for national military forces to maintain their warfighting capabilities, their primary mission. These factors have led to a reevaluation of the role of military forces in future peace operations. This paper examines the evolution and dimensions of peacekeeping operations, describes the nature of existing conflicts and provides guidance for the use of military force in future peace operations. It recommends that military force be robust enough to dominate the situation and deter interference; that military force used to protect other means of conflict resolution be capable of carrying out enforcement actions as well; that military force should be used establish the conditions for peace rather than maintaining a cease-fire, that for unity of effort in peace operations, all available means in peace operations should be coordinated by the United Nations for legitimacy and unity of effort; and that the political and diplomatic elements should be strengthened.

The Hazard from Reaerosolised Biological Warfare Agents

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Abstract: Experience in many fields has shown that contaminated ground surfaces may be secondary sources of airborne contamination. The reaerosolisation of biological agent from surfaces after the dispersion of the original cloud from a weapon might profoundly influence the hazards to military personnel or the public following the event and might demand additional control and protection measures during the following days and weeks, complicating the planning of any clean-up operation reaersolisation of contaminants from surfaces has been studied for several decades in the nuclear industry and in relation to biological warfare agents (BWAs) also. A large review has been carried out of the literature relating to reaerosolisation, and scoping calculations completed to predict the likely airborne concentrations following a range of activities including troop, vehicle and aircraft movement, and from wind alone. The literature shows that troop and vehicle movement readily resuspends BWAs from the ground surface. The coping calculations suggest that inhalation rates may be of the order of hundreds to thousands of spores per minute from wind, troop, vehicle, and aircraft movement shortly after a BWA attack. Decontamination attempts may cause reaerosolisation of BWAs, although the effects of such procedures appear not to have been fully quantified for the techniques which might be commonly used.

High Resolution Modeling of a Terrorist Chemical Attack in an Urban Area

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Abstract: This thesis demonstrates the use of Janus in Modeling Military Operations Other Than War, MOOTW. Janus has many uses throughout the United States military. Lately, MOOTW have become a major percentage of the U.S. military's efforts. Using Janus to model these operations can help predict casualties, determine if new pieces of equipment make a difference in the operation, and help evaluate "what ifs" in operations. More importantly, conducting a simulation before carrying out an actual exercise saves money and people's time and effort. The threat of a terrorist chemical attack is a very likely event in this day and age as demonstrated by the 1995 chemical attack in a Japanese subway. Current U.S. policy has allocated certain resources to assist local governments in the event of an emergency. Unfortunately, these assets can not immediately respond to a chemical crisis. Time waiting for these assets to arrive must be spent wisely to save lives. Local governments do not all have the same capabilities available to respond to a chemical attack. Using a high resolution combat model such as Janus at the local level will help determine assets that will save lives and money.

Laser-Induced Breakdown Spectroscopy (LIBS) for Real-Time Detection of Halon Alternative Agents

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Abstract: We report results of an evaluation of laser-induced breakdown spectroscopy (LIBS) for the detection of candidate halon replacement compounds (CF4, CF3H, CF2H2, and C2F3H). The fundamental (1.064 micrometers) from a Nd:YAG Q-switched pulsed laser was focused into an air flow containing 0.0005-5% of the analyte halocarbon compounds. The laser-produced plasma emission consists of a large number of intense fluorine atom lines in the 600-850-nm spectral range. Limit-of-detection studies indicate that LIBS can detect these compounds in the parts-per-million range. Also, we have recorded single-shot LIBS spectra with good S/N using an intensified photodiode array. Our results indicate that LIBS is a promising detection technique for in-situ and real time measurement of halons during use in full-scale fire-suppression testing.

Mass Spectral Data of Trimethylsilyl Esters of Alkyl and Cycloalkyl Methylphosphonates

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Abstract: The development of a procedure for the recording of reference mass spectra of trimethylsilyl (TMS) esters of alkyl and cycloalkyl methylphosphonates is described. The compounds are prepared in situ, on a small scale, from methylphosphonic difluoride and a selected alcohol dissolved in acetonitrile. Hydrolysis of the formed alkyl and cycloalkyl methylphosphonofluoridates to the corresponding methylphosphonates, evaporation to dryness and trimethylsilylation of the residue produces the TMS esters. The resultant reaction mixture is analysed by gas chromatography-mass spectrometry. In this way, electron impact mass spectra of TMS esters of 17 alkyl (ranging from butyl to nonyl) methylphosphonates and five cycloalkyl methylphosphonates were recorded. The mass spectra and a short description of the fragmentation processes of the TMS esters are presented.

Material and Comfort Parameters of a New Chemical, Biological Combat Suit and Its Components

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Abstract: The function of a Chemical, Biological (CB) protective garment is to provide protection to the wearer against the ingress of toxic agent in either a liquid or vapor form. The garment currently in-service with the Australian Defense Forces (ADF) is the UK MK IV suit, which is worn over the Disruptive Printed Combat Uniform (DPCU). It has been found that in hot humid conditions troops wearing this type of CB overgarment could operate effectively for only short periods of time before succumbing to heat stress. The most effective method for reducing the incidence of heat stress is to reduce the thermal burden created by the CB overgarment. This can be achieved by simply removing the air trapped between the clothing layers.

Medical Readiness: DoD Faces Challenges in Implementing Its Anthrax Vaccine Immunization Program

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Abstract: The Department of Defense (DOD) regards the biological agent anthrax, an infectious disease that is 99-percent lethal if inhaled by unprotected humans, as the single greatest biological weapon threat to U.S. military forces. To counter this threat, the Secretary of Defense announced in December 1997 a plan to immunize all active and reserve military personnel with a licensed anthrax vaccine. The Secretary stipulated that immunizations would not begin until DOD (1) established a means of testing the vaccine over and above tests required by the Food and Drug Administration (FDA), (2) developed a system for tracking vaccinations, (3) approved operational and communication plans for the vaccination program, and (4) had an outside expert review the health and medical aspects of the program. In May 1998, the Secretary announced that his conditions had been met, and in August 1998, DOD began immunizations, giving first priority to personnel deployable to southwest and northeast Asia, areas where U.S. forces are considered at high risk of exposure to anthrax.

NBC Hazard Prediction Model Capability Analysis

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Abstract: This report provides a limited operational assessment of the DoD standard NBC hazard prediction models, focusing on the VLSTRACK and HPAC models. The motivation for this effort was a concern about variance in hazard predictions produced by operational users. The study team conducted a survey of users at the CINCs and many of the major commands. There was little evidence of standardization or institutionalization of hazard prediction in general or the use of models such as HPAC or VLSTRACK in particular. There were significant differences in focus, opportunities for model use, and skills at the various levels of command that are likely to have a considerable impact on the employment of the models. In comparing the models, even in simple scenarios, the models sometimes produced very different predictions. In several cases, there were significant differences in source term and toxicological assumptions. Accounting for these differences led to outputs that were more similar in some, but not all, cases. A significant portion of the variation appears to be due to fundamental differences in the modeling of transport and dispersion.

Operational Design: The Impact of Nuclear, Biological, and Chemical Attack on U.S. Forces During Power Projection and Sustainment Operations

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Abstract: The potential for an adversary's use of weapons of mass destruction (WMD) against U.S. forces during the power projection and sustainment phases of a major operation has been recognized but there has been little attention paid to what we could do to mitigate the threat in terms of our operational design. Planners have largely assumed that deterrence will work or failing that, NBC protective measures will allow us to "muddle through" This essay will argue that there are six specific elements the combatant commander must incorporate into his operational design to mitigate the impact of enemy use of WMD in delaying, disruption, deterrence, and denial operations against U.S. forces in initial power projection and sustainment phases of a major operation. They are: (1) use of intelligence to identify the enemy WMD system; (2) use of operational fires to degrade that system; (3) adjustment of the operational timeline to account for WMD effects; (4) dispersion of U.S. forces during deployment and employment; (5) early deployment of NBC decontamination units and port/airfield management agencies; and (6) operational deception to induce the enemy to expend his weapons against irrelevant targets. It concludes that we must incorporate these elements into our war games and refine our joint doctrine to enhance our understanding and gain a thorough appreciation for what it will take to be successful against and adversary who would attempt to deny our access to a region with WMD.

Operational Organization for Homeland Defense

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Abstract: In response to the growing threat of terrorism with chemical, biological and nuclear weapons, the United States government has developed a national concept of operations for responding to their use. This concept of operations consists of multiple agencies at the local, state and federal levels reacting to an incident with no clear operational organization for efficient command and control and effective response. A step in the right direction to resolve this potentially critical problem is to develop an organization under a single commander with the responsibility for domestic preparedness, response, and consequence management. Only with the proper command organization and subsequent unity of effort can we ensure the most effective employment of the many forces and resources currently tasked with homeland defense against and response to weapons of mass destruction.

Revolutionizing the United States Army's Chemical Defense through the Acquisition of Software and Software-Intensive Systems

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Abstract: This thesis presents an analysis of how the United States Army can revolutionize the passage of critical chemical defense information on the battlefield. The current process for passage of this critical information is heavily dependent on short-range and stand-alone chemical detection systems, transmitted over secure radio vertically throughout the chain of command. These factors result in inaccurate, time-lagged information reaching command decision- makers, increasing the risk of contaminating additional soldiers and equipment. Through the insertion of new products, with integrated software to automate the passage of this hazard information, the Army is changing this process for the flow of chemical contamination information. The resulting new process is expected to increase battlefield awareness thereby decreasing the probability of spreading the contamination across the battlefield, maintaining the ability for soldiers to accomplish their missions. Analyzing this change using Davenport's model for large-scale innovation, the revised chemical process still requires additional equipment and cultural changes to maximize the effectiveness of the Army XXI soldier.

Sample Preparation and Identification Techniques for Chemical Warfare and Mid-Spectrum Agents. A General Survey for the NATO AC/225 LG-7-SIBCA Handbook, Chapter 8

http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=TR_U2&search.DOC_TEXT=&search.ADNUMBER.TEXT=&search.TITLE.TEXT=&search.PERS_AUT.TEXT=&search.CORP_AUT.TEXT=&search.SRC_CODE.TEXT=&search.DESCRIPT.TEXT=%22chemical+warfare%22&search.REP_DATE.GTEDATE=1999-01-01&search.REP_DATE.LTEDATE=1999-12-31&search.ABSTRACT.TEXT=&search.FLD_GROUPS.TEXT=&search.CONT_NUMBER.TEXT=&search.DESC_NOTE.TEXT=&search.IDENTS.TEXT=&secondorderby=&numrecords=250&fuzzy=0

Abstract: Sample preparation and identification techniques for chemical warfare and mid-spectrum agents were surveyed as part of Canada's contribution to a joint NATO project to create a NATO Handbook on the sampling and identification of biological and chemical agents. Sample preparation techniques such as solid phase extraction, supercritical fluid extraction and derivatization were reviewed with respect to their applicability to chemical warfare and mid- spectrum agents. Identification techniques including; gas chromatography, liquid chromatography, mass spectrometry, Fourier transform infrared spectroscopy and nuclear magnetic resonance spectroscopy were examined in light of the need to confirm the identity of these agents in the presence of complex background matrices.

Second NATO/SIBCA Exercise on Sampling of Chemical Warfare Agents

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Abstract: In order to practice the sampling of chemical warfare agents under realistic conditions, the Netherlands participated successfully in the second NATO/SIBCA sampling exercise conducted in Poland on 1-3 September 1998 within the framework of the NATO Partnership for Peace' program. The Netherlands' team consisted of a combination of military personnel from the NBC School of the Royal Netherlands Army and employees of the TNO Prins Maurits Laboratory (TNO- PML). The exercise involved the taking of four different kinds of samples (air, water, soil and materials) under NBC conditions thus including personal protection, detection, decontamination and reporting. During the exercise the activities were judged by umpires based on an extended checklist. The exercise was carried out with a stimulant (triethyl phosphate) followed by the chemical warfare agent sulphur mustard gas.

Sterilization and Decontamination of Surfaces Contaminated With Biological and Chemical Warfare Agents Using Atmospheric Pressure Plasma Discharges

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Abstract: Our Phase I effort was meant to demonstrate that an effective technology for rapid surface sterilization of biological contaminants and neutralization of chemical warfare agents could be developed based on the application of an atmospheric pressure plasma. We used both a DC corona and dielectric barrier discharge for the sterilization tests which were conducted on a variety of substrates including metals and chemically resistant fabrics. Medically accepted biological indicator spores (Bacillus subtilis var niger and Bacillus stearothermophilus) were used to determine the effectiveness of the plasma discharge. The chemical neutralization tests were conducted using a DC corona discharge on a metal substrate contaminated with either diisopropylmethyl phosphonate or dimethylmethyl phosphonate. These simulants are of similar chemical structure to classes of chemical warfare agents like GB and Sarin. Results include decomposition of the chemical agent simulants with decomposition by-products including water, acetic acid and gases like CO2; complete sterilization in 15 minutes of some substrates contaminated with up to 105 spores over about a 1 cm2 and the concentration of the model pathogens and the surface characteristics of the contaminated substrate affects the sterilization results. A rough surface with defects is difficult to completely sterilize on short time scales.

Tests of Level B Suits - Protection Against Chemical and Biological Warfare Agents and Simulants: Executive Summary

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Abstract: Six Level B protective suits were tested for GB and HD permeation swatch testing using modified procedures of TOP 8-2-501. Agent break-through times were calculated for each suit. Aerosol agent simulant tests of suit systems were conducted to measure overall protection factors of the suits.

The Threat of WMD: Will We Hold It at Risk, or be Held at Risk By It?

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Abstract: American interests require the U.S. military to maintain a power projection capability to defend those interests. WMD can effectively hold the U. S. at risk - vice the U.S. holding such threatening actors at risk. The threat such weapons impose on U.S. national interest, American citizens, and to U.S. allies requires more than reliance on deterrence and U.S. non-proliferation (NP) efforts. More active options, such as a preemptive strike capability, offer a greater deterrent threat than the threat of retaliation. This capability is required in our counter-proliferation (OP) efforts, and should be utilized to reduce the threat to American forces (in the event deterrence fails). Operational commanders must have the capability to deny the adversary an ability to hold us at risk with WMD. We must develop the necessary tools to conduct preemptive strike options (and refine and exercise these capabilities), before we again encounter the threat of utilization of WMD against our forces. Without the above requisite tools, we will limit our options to response only. Without the capability to preempt an adversary's threatened use of WMD, we will remain at risk, vice holding this threat at risk. In order to counter this threat, these shortfalls must be fixed. If we do not actively seek to deny our adversary his WMD threat, we will be locked into facing the threat of deploying, operating, and fighting in contaminated environments.

The U.S. Army and Doctrine for Weapons of Mass Destruction: Consequence Management Operations

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Abstract: As the nuclear threat between the United States and the Soviet Union has diminished, new threats now face the nation. The end of the Cold War world brought with it the unleashing of rogue states and terrorist organizations that no longer feel constrained by the superpowers. Coupled with the release of technology worldwide, no nation is risk free from attack on its own soil. While the threat of terrorism in of itself is not new, the threat of the use of weapons of mass destruction (WMD) on American soil creates a new risk to national security. Tasked by Congress, the Department of Defense developed programs and capabilities to deal with consequences of a WMD attack on U.S. soil. This study conducts an analysis of the U.S. Army's current WMD consequence management operations doctrine. The analysis is based on a model developed by Colonel Dennis M. Drew, a former Air Force officer who wrote numerous books and articles concerning military doctrine and strategy. The results of the analysis point to many shortcomings in current Army doctrine. Recommendations are provided to better prepare the Army to fulfill its role in consequence management operations.

Weapons of Mass Destruction and United States NBC Defense Readiness: Has America Provided the Attacker Asymmetric Advantage

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Abstract: This monograph begins by examining the published definitions of asymmetry and asymmetric warfare as they exist in contemporary literature and official documents. In addition, NBC defense readiness is analyzed to determine the level of readiness that creates asymmetry in relation to weapons of mass destruction. From this review and analysis a definition of asymmetric warfare is developed. The definition and its components serve as the evaluation criteria to judge whether WMD use against the U.S. would be truly asymmetric. Case studies serve as the test environments or experiments (Operation Desert Storm and the 1996 Summer Olympic Games in Atlanta, Georgia). Each case study was selected based on its potential for WMD volatility. Although in both cases no U.S. troops or civilians were exposed to WMD, planning considerations and force protection measures were serious concerns. Lastly, the case studies are analyzed with regard to the developed definition to determine if WMD attacks in either case study would be considered asymmetric. Analyses of Operation Desert Shield/Storm and the 1996 Summer Olympic Games in Atlanta proved beneficial in obtaining a realistic view of U.S. NBC defense preparedness against a WMD attack. Both studies revealed substantial deficiencies with respect to meeting established standards of NBC defense preparedness, which created vulnerability to asymmetric attack using weapons of mass destruction. A review of current federal, state and local actions to mitigate these deficiencies are discussed at the close of the monograph.

CONVENTIONAL ARMS CONTROL

Anti-Personnel Landmine (APL) Detection Technology Survey and Assessment

http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=TR_U2&search.DOC_TEXT=&search.ADNUMBER.TEXT=&search.TITLE.TEXT=&search.PERS_AUT.TEXT=&search.CORP_AUT.TEXT=&search.SRC_CODE.TEXT=&search.DESCRIPT.TEXT=%22land+mines%22&search.REP_DATE.GTEDATE=1999-01-01&search.REP_DATE.LTEDATE=1999-12-31&search.ABSTRACT.TEXT=&search.FLD_GROUPS.TEXT=&search.CONT_NUMBER.TEXT=&search.DESC_NOTE.TEXT=&search.IDENTS.TEXT=&secondorderby=&numrecords=100&fuzzy=0

Abstract: A survey was made of technologies and systems available to detect anti-personnel landmines for the purpose of monitoring or verifying a potential treaty-based landmine ban. A literature search revealed that numerous devices and supporting research exist for the point-source detection of anti-personnel landmines (APL), but only a few systems were found to be under development that address the more rapid detection of multiple APL and entire minefields over a wide area. Given the potential treaty

verification need to be able to detect and describe the boundaries of existing and new APL use, and a complementary technical requirement in humanitarian demining, an assessment was made of those technologies that might be applicable to the wide-area detection mission, followed by the identification and assessment of pertinent systems. This survey identified certain promising RDT&E efforts, but none currently appear to provide a complete or near-term solution to the wide-area detection of landmines and minefields. A combination of sensors through sensor fusion and data fusion may hold promise for minefield detection with a higher degree of confidence An investigation was also made of other technical disciplines not normally associated with landmine detection for the contribution they might make for the wide-area detection of landmines. None of the ten fields explored, however, offered any unique or more effective approaches or solutions to the mission. The study concludes with observations on the state of research and development in wide-area landmine detection and offers recommendations concerning the specification of technical requirements and for potential future initiatives in this field.

China's Arms Sales Motivations and Implications

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Abstract: China's arms transfers have become the focus of considerable attention. In the 1980s, China emerged as a major supplier of conventional weapons to the developing world. More recently, China's transfers of ballistic missiles and nuclear weapons technology, as well as equipment and materials that could be used in the manufacture of chemical and biological weapons, have seized world attention, particularly in the United States. This study documents China's principal arms-transfer relationships, analyzes the motivations of supplier and recipients, evaluates which arms transfers are of greatest concern, and identifies possible constraints on China's arms sales. It then assesses the threat posed by the transfers.

Computer Modeling of Jamming Effects on Infrared Missiles

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Abstract: Development of effective countermeasures for use against infrared (IR) missiles is hindered by the difficulty inherent in testing tactical missiles. The designers of such a countermeasure must devise a means of reproducing missile attitude after the test flight to

allow for further analysis. This thesis describes an Inertial Measurement Unit (IMU) compact enough to be mounted on board a 4.5 inch missile. The IMU sensing elements are three quartz rate sensors providing yaw, pitch and roll rates, arid the functionality of a gyro-stabilized system without the extensive electronics and high-speed spinning rotor. These micro-miniature, solid state devices are durable and compact; yet robust enough to allow for the precise recreation of missile attitude. A Simulink model is presented that accepts missile strap-down angular rates and, using an Euler rotation technique, produces yaw, pitch, and roll angles in an earth reference. The model corrects for sensor cross coupling, bias, and other factors. It has been calibrated using Carco Table test data, producing angles that matched expected values to within 2 degrees RMS on each axis. The resulting highly accurate attitude profile is stored as angle data and can also be viewed via an animation utility.

Defense Trade: Department of Defense Savings from Export Sales Are Difficult to Capture

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Abstract: In 1998, the Department of Defense (DOD) and its contractors planned to sell to foreign countries defense equipment, articles, and services worth a total of about $44.3 billion. One of the U.S. government's goals in exporting defense items, as articulated in the 1995 Conventional Arms Transfer Policy, is to allow DOD to meet its defense requirements at less cost. To determine whether DOD is maximizing this benefit, we reviewed the sales of five major weapon systems-the Hellfire Missile, Advanced Medium Range Air-to-Air Missile (AMRAAM), High Mobility Multipurpose Wheeled Vehicle (HMMWV), Black Hawk Helicopter, and Aegis Weapon System. Specifically, as requested, we determined whether (1) export sales reduced the price of the five weapon systems, (2) DOD waived the requirement to recover nonrecurring research and development and production costs associated with the sales, and (3) DOD included this information when notifying the Congress about the sales or requesting budgetary authority to purchase the weapon systems.

An Evaluation of the U.S. Policy on Anti-Personnel Landmines

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Abstract: Landmines have received a great deal of attention. Debating their utility has become a major military/humanitarian issue. Current U.S. policy on anti-personnel landmines (APL) consists of three major positions. The first position is banning the use, stockpiling, production, and transfer of APL. The second position is to develop APL alternatives through aggressive research and development. The last position is to improve mine detection and clearing technology for current and future humanitarian demining operations. The purpose of this paper is to evaluate each major position against what has been done to date (looking at ends, ways, and means) and then extrapolate this out to the years 2020-2025. This paper evaluates the current policy's effectiveness by looking at the various programs implemented and actions taken to date. It concludes with recommended changes to U.S. Policy.

Export Controls: Implementation of the 1998 Legislative Mandate for High Performance Computers

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Abstract: We found that most of the 938 proposed exports of high performance computers to civilian end users in countries of concern from February 3, 1998, when procedures implementing the 1998 authorization act became effective, to March 1999, did not require a license. The agencies that reviewed the exporters' proposals-the Departments of Commerce, Energy, Defense, and State and, until March 1999, the Arms Control and Disarmament Agency-allowed 828 proposed high performance computer exports to continue without a license, but they required license applications for 101 proposed exports. Nine export proposals were classified as "incomplete and returned to the exporter. The majority of the agencies' objections to the 101 proposed exports were based on concerns that the proposed end users of the computers might have been involved in military or proliferation-related activities. Of the 101 license applications required, 16 were approved and 6 were denied. The remaining 79 were returned to the exporters without action, which essentially blocks the proposed export. Licenses that were approved had additional conditions placed on the reexport or end use of the computers. The majority of these applications involved China, India, and Israel. Licenses were required in nine cases where the end user had previously received computers without a license before the Authorization Act was implemented.

Export Controls 1998 Legislative Mandate for High Performance Computers

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31&search.ABSTRACT.TEXT=&search.FLD_GROUPS.TEXT=&search.CONT_NUMBER.TEXT=&search.DESC_NOTE.TEXT=&search.IDENTS.TEXT=&secondorderby=&numrecords=100&fuzzy=0

Abstract: In 1996, the executive branch streamlined its export controls for high performance computers by removing licensing requirements for most exports to civilian end users while focusing control on military and proliferation related end users. This streamlined process made exporters responsible for determining if they needed to apply for an export license because they were selling a computer to a military or proliferation related end user. In 1997, however, several high performance computers were exported to Russian nuclear weapons laboratories and to a military end user in China without a license. Concerned that exporters may not be aware of the activities of the end users they sell to, Congress included a provision in the fiscal year 1998 National Defense Authorization Act (P.L. 105-85) to require exporters to notify the Commerce Department of any proposed high performance exports to countries that pose a concern for military or proliferation reasons to determine if these exports need a license. The act also requires Commerce to verify that high performance computers exported to countries of concern are being used by the appropriate end user for the intended purpose. In response to your request, we determined (1) whether exporter notification to Commerce of proposed sales of high performance computers to countries of concern has resulted in license applications and what final action was taken on these licenses and (2) how Commerce is conducting post-shipment verifications of the use of high performance computers after their export to these countries.

Export Rules for the Test and Evaluation Professional

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Abstract: Basic knowledge of the U.S. International Traffic in Arms Regulations (ITAR) is in the Test and Evaluation (T&E) professional's best interests. Compliance with the ITAR on some projects may be necessary and may seem burdensome, even frustrating. But non-compliance is not an option. While not an all-encompassing primer on import/export regulations, this paper serves as a wake up and reminder on key requirements, and highlights some of the current rules.

Foreign Military Sales: Efforts to Improve Administration Hampered by Insufficient Information

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Abstract: In response to your concerns, we assessed the Foreign Military Sales program to determine the changes needed to improve the viability of the program. Specifically, we evaluated (1) whether the Foreign Military Sales program has achieved full recovery of its administrative costs, (2) the Defense Security Cooperation Agency's basis for making administrative account adjustments, and (3) the effectiveness of various Foreign Military Sales reinvention efforts in terms of cost recovery.

Foreign Military Sales: Review Process for Controlled Missile Technology Needs Improvement

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Abstract: The United States generally exports military items and services either through (1) U.S. government sales under the Foreign Military Sales (FMS) program or (2) direct commercial arms sales by individuals and business entities. The Arms Export Control Act authorizes the President to control the export of all defense articles and services and to designate items that are to be controlled under the U.S. Munitions List. The President delegated the control of exports of Munitions List items to the Secretary of State and the implementation of the FMS program to the Secretary of Defense. As part of its responsibilities, the State Department regulates direct commercial arms sales through export licenses and reviews and approves arms sales under the FMS program. Within the Department of Defense (DOD),the Defense Security Cooperation Agency is responsible for overall administration of the FMS program, while the military departments implement individual sales under the program. The Arms Export Control Act generally excludes sales under the FMS program from the requirement for munitions export licenses.

Influence and Outcome: The Making of a U.S. Policy on Anti-Personnel Landmines

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Abstract: In the spring of 1996, a very public and rancorous debate ensued over the question of whether the United States would lead, or even join in, the global effort to ban the manufacture and use of anti-personnel landmines. It was a debate that had been dragging on for a while among foreign policy elites and defense experts both in and out

of uniform. However, in a very short period of time a series of events caused the issue to spill over into the public arena. Understanding the emotion and deep convictions that surround the issue of a permanent ban on anti-personnel landmines requires some appreciation for the unique place mines hold in the history of warfare. Few weapons have caused more suffering and engendered more terror in generations of foot soldiers and civilian victims of conflict than have the silent killers buried deep beneath the soil of the battlefield. Similarly, understanding the mechanics of attempting to draft and implement a ban on landmines requires one to become familiar with the legal aspects of landmines as weapons. Those who support a total ban on anti-personnel landmines, as well as those who advocate their use, find justification for their positions under international law as derived from both treaty and custom. Finally, a quick look at the recent history of international efforts to ban anti- personnel landmines is necessary to better understand how the issue made it from the meeting rooms of international conferences half a world away and onto the foreign policy agenda of the Clinton administration in early 1996.

Losing Anti-Personnel Landmines: An Economy of Force

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The 1997 Ottawa Conference recently banned anti-personnel landmines (APLM) and created international pressure for non-signatories such as the United States, to abide by its mandate. This paper will address the operational need for landmines. It examines the role of landmines as an economy of force in operational maneuver and flexibility, as well as their affects on the operational factors of war. It will explore the impact of eliminating landmines on the Korean peninsula and offer alternatives to the Operational Commander. The paper will argue that the elimination of landmines, without a proven and cost efficient alternative to APLM, creates a substantial capability gap and ignores the increased risk to U.S. Forces. Finally, it will briefly examine future systems under exploration to replace APLM that might offer the Operational Commander an alternative capability.

The Ottawa Treaty and Coalition Warfare: An Unholy Alliance?

http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=TR_U2&search.DOC_TEXT=&search.ADNUMBER.TEXT=&search.TITLE.TEXT=&search.PERS_AUT.TEXT=&search.CORP_AUT.TEXT=&search.SRC_CODE.TEXT=&search.DESCRIPT.TEXT=%22arms+control%22&search.REP_DATE.GTEDATE=1999-01-01&search.REP_DATE.LTEDATE=1999-12-31&search.ABSTRACT.TEXT=&search.FLD_GROUPS.TEXT=&search.CONT_NUMBER.TEXT=&search.DESC_NOTE.TEXT=&search.IDENTS.TEXT=&secondorderby=&numrecords=25&fuzzy=0

Abstract: The purpose of this study is to show how the United States and our coalition partners have failed to fully consider the impact of the recently signed Ottawa Treaty to

ban Anti-Personnel Landmines (APLs) on our ability to execute successful coalition warfare. This paper describes the serious implications for NATO and Coalition operations in view of the bulk of our Allies signing the Ottawa Treaty banning the use of all anti-personnel landmines (APLs) . This paper will argue that the cost to NATO and other Coalition operations due to Ottawa clearly demonstrates the shortcomings in this treaty. This paper also provides some key recommendations that, if adopted, will ensure that the United States can fight effectively with Allies all over the globe.

Statistical Signal Processing for Demining: Experimental Validation

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Abstract: Under the support provided by ARO in the form of a MURI for Humanitiarian demining, successful techniques for discriminating between mines and anthropic clutter have been developed using a statistical signal processing approach. The improved performance provided by these algorithms has been validated using data obtained by DARPA. In order determine whether these algorithms have wider application than the relatively high-metallic content mines used in the DARPA experiment, the Joint UXO Coordination Office (JUXOCO) was interested in augmenting the work begun under the MURI. JUXOCO is sponsoring a series of experiments designed to establish a performance baseline for metallic mine detectors. This baseline will be used to measure the potential improvements in performance offered by advanced signal processing algorithms. The goal of the work funded under this grant was to collect data from low-metal content mine using Geophex's GEM-3 sensor and to begin the development of improved detection algorithms. This report provide a summary of the results obtained during the course of this study and a summary of experimental data acquisition methods.

United States Army Operations under the Ottawa Convention: Mine Warfare without Antipersonnel Landmines

http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=TR_U2&search.DOC_TEXT=&search.ADNUMBER.TEXT=&search.TITLE.TEXT=&search.PERS_AUT.TEXT=&search.CORP_AUT.TEXT=&search.SRC_CODE.TEXT=&search.DESCRIPT.TEXT=%22land+mines%22&search.REP_DATE.GTEDATE=1999-01-01&search.REP_DATE.LTEDATE=1999-12-31&search.ABSTRACT.TEXT=&search.FLD_GROUPS.TEXT=&search.CONT_NUMBER.TEXT=&search.DESC_NOTE.TEXT=&search.IDENTS.TEXT=&secondorderby=&numrecords=100&fuzzy=0

Abstract: This thesis explores the impacts of the Ottawa Convention ban of antipersonnel landmines on U.S. Army operations. The Unites States has not signed the convention, but the thesis explores the impacts should the U.S. decide to abide by this international agreement The thesis looks at the history of landmine warfare, the provisions of the Ottawa Convention, the specific functions of antipersonnel landmines, and the ability of

other systems to replace antipersonnel landmines. Based on the inability of other systems to completely replace antipersonnel landmines, this thesis draws on other studies to determine the degree of vulnerability U.S. forces would find themselves in operations consistent with the Ottawa Convention.

View towards Change: The United States-Republic of Korea Arms Trade Relationship Through the Post-Cold War

http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=TR_U2&search.DOC_TEXT=&search.ADNUMBER.TEXT=&search.TITLE.TEXT=&search.PERS_AUT.TEXT=&search.CORP_AUT.TEXT=&search.SRC_CODE.TEXT=&search.DESCRIPT.TEXT=%22arms+control%22&search.REP_DATE.GTEDATE=1999-01-01&search.REP_DATE.LTEDATE=1999-12-31&search.ABSTRACT.TEXT=&search.FLD_GROUPS.TEXT=&search.CONT_NUMBER.TEXT=&search.DESC_NOTE.TEXT=&search.IDENTS.TEXT=&secondorderby=&numrecords=100&fuzzy=0

Abstract: In May 1998, Deputy Secretary of Defense John Hamre ordered an extensive review of the Pentagon's foreign military sales (FMS) process. The impact of this review could result in the dismantling of an empire of bureaucracy that evolved during the Cold War. The review was brought on after complaints from senior officials and an apparent realization that the cumbersome FMS process, a legacy of Cold War-era U.S. security assistance, was driving U.S. allies to other suppliers of military goods and services who are willing to deal more flexibly. There is perhaps no better example that demonstrates the need to develop a more productive course in arms trade relations than that involving the United States and the Republic of Korea (ROK).

Wave Propagation Model and Simulations for Landmine Detection

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Abstract: A simplified 1-dimensional transmission light model of electromagnetic waves propagation in mine fields is considered. This model might be used as a first indicator of the presence of land mines. Next, the 2D inverse algorithm would image mines. It is shown that this 1-dimensional model is in general agreement with published Army data.

Year 2000 Issues Relating to Security Assistance and Foreign Military Sales

http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=TR_U2&search.DOC_TEXT=&search.ADNUMBER.TEXT=&search.TITLE.TEXT=&search.PERS_AUT.TEXT=&search.CORP_AUT.TEXT=&search.SRC_CODE.TEXT=&search.DESCRIPT.TEXT=%22foreign+military+sales%22&search.REP_DATE.GTEDATE=1999-01-01&search.REP_DATE.LTEDATE=1999-12-31&search.ABSTRACT.TEXT=&search.FLD_GROUPS.TEXT=&search.CONT_NUMBER.TEXT=&search.DESC_NOTE.TEXT=&search.IDENTS.TEXT=&secondorderby=&numrecords=100&fuzzy=0

Abstract: Objectives. The overall audit objective was to determine whether management processes were in place, and operating effectively, to ensure that foreign customers were made aware of Y2K issues. We determined whether the processes developed by the Military Departments were adequate to assist foreign customers in identifying Y2K deficiencies. Results. The processes that the Defense Security Cooperation Agency and the Military Departments used to notify foreign military sales customers about the Y2K compliance- status of items purchased through the foreign military sales program were adequate. The Defense Security Cooperation Agency provided general policies and procedures, which the Military Departments implemented, to ensure that foreign military sales customers were notified of potential Y2K problems with systems and equipment purchased through the program. The Army sent written notifications to DoD security assistance organizations identifying all known noncompliant Army systems that had been sold to foreign military sales customers. As of April, 1999, the Navy had sent more than 300 notification letters to security assistance organizations and summarized the results in a matrix to allow for tracking and response. The Air Force had identified all known equipment sold to foreign military sales customers and developed a report on the Y2K status of foreign military sales systems. It distributed the report through the security assistance organizations. As a result of those efforts, the effect of any Y2K problems on interoperability with U.S. allies will be reduced.

NUCLEAR PROLIFERATION

Assessment of the Fate of Radioactive Contaminants in the Ob River, Siberia, Russia

http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=TR_U2&search.DOC_TEXT=&search.ADNUMBER.TEXT=&search.TITLE.TEXT=&search.PERS_AUT.TEXT=&search.CORP_AUT.TEXT=&search.SRC_CODE.TEXT=&search.DESCRIPT.TEXT=%22nuclear+weapons%22&search.REP_DATE.GTEDATE=1999-01-01&search.REP_DATE.LTEDATE=1999-12-31&search.ABSTRACT.TEXT=&search.FLD_GROUPS.TEXT=&search.CONT_NUMBER.TEXT=&search.DESC_NOTE.TEXT=&search.IDENTS.TEXT=&secondorderby=&numrecords=250&fuzzy=0

Abstract: This project has studied the distribution of particle reactive natural and artificial radionuclides in sediment cores of the Ob River, Siberia in order to determine the release and transport of nuclides from nuclear weapons related activities of the former Soviet Union. The Ob River drainage basin houses the bulk of the former Soviet Union's weapons production facilities (Mayak and Tomsk-7) as well as the major test site of Semipalatinsk. In addition, some 2 billion curries of nuclear waste from weapons production are stored or have been released to the environment in this area. The potential for catastrophic future releases from poorly maintained tanks and open storage ponds is real. This project has sought to develop a history of transport and deposition of nuclides released from these plants, and to use these data as a basis for estimating delivery to the Arctic Ocean and to predict rates of transport in the event of future releases.

The Balance of Power in South Asia: The Strategic Interests and Capabilities of India, China and Pakistan

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Abstract: In May of 1998 India and Pakistan each detonated a series of nuclear devices, and as a result the world perception of the strategic situation in South Asia has changed considerably. While the timing of the tests may have caught some analysts off guard, the tests themselves were not overly surprising. It has been understood by many experts in the field for some time that both countries possessed the capability, if not the actual components, to assemble and detonate nuclear weapons. India had tested a crude device in 1974, calling it a "peaceful nuclear explosion," but did not test again until May 1998, pursuing a path of "nuclear ambiguity." Likewise, while Pakistan has maintained an even more ambiguous stance, it nevertheless has hinted at some nuclear weapons capability since the early 199Os. The tests only served to confirm what we already knew about the two countries, but at the same time they place us in a position to explore the strategic interests of the region in the shadow of the tests.

China as Peer Competitor? Trends in Nuclear Weapons, Space, and Information Warfare

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Abstract: In China as Peer Competitor? Trends in Nuclear Weapons, Space, and information Warfare Lt Col. Kathryn L. Gauthier analyzes the potential for China to emerge as a peer competitor of the United States in the coming decades. First, she examines two traditional pillars of national strength--China's status as a nuclear weapons state and as a space power. Second, she then explores China's growing focus on information warfare (IW) as a means to wage asymmetric warfare against a technologically advanced adversary. Third, the author carefully examines the status of the three programs highlights areas of concern and potential conflict with the United States, and analyzes the implications of these issues for the United States.

China's Nuclear Strategy

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LE.TEXT=&search.PERS_AUT.TEXT=&search.CORP_AUT.TEXT=&search.SRC_CODE.TEXT=&search.DESCRIPT.TEXT=%22nuclear+proliferation%22&search.REP_DATE.GTEDATE=1999-01-01&search.REP_DATE.LTEDATE=1999-12-31&search.ABSTRACT.TEXT=&search.FLD_GROUPS.TEXT=&search.CONT_NUMBER.TEXT=&search.DESC_NOTE.TEXT=&search.IDENTS.TEXT=&secondorderby=&numrecords=250&fuzzy=0

Abstract: The objective of this task was to analyze Chinese interests on a range of nuclear issues of interest to Washington, including arms control, nonproliferation, and force modernization. The paper reports on three project activities made possible by support from IDA's central research program. The first was a study group on China and nuclear arms control, cochaired with the National Defense University and the Council on Foreign Relations. The second was an assessment of possible Chinese reactions to developments in the U.S.-Russian offense/defense relationship. The third was an exchange of views on U.S.-PRC cooperation on international security that took place in China in the immediate aftermath of the bombing of their embassy in Belgrade. The central conclusions are that Chinese interests remain poorly understood in Washington and that Chinese reactions to U.S. initiatives may come as an unwelcome surprise.

Concept of Gamma-Ray Lasing Assisted by Nuclear Recoil Effect

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Abstract: This report results from a contract tasking MIREA Technical University as follows: The contractor will develop an analytical and quantitatively proven treatment of how to incorporate the nuclear recoil phenomenon into the nuclear gamma-ray lasing process, including the basic scheme of a first demonstration experiment.

Department of Energy: Key Factors Underlying Security Problems at DOE Facilities

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Abstract: We are pleased to be here today to discuss our past work involving security at the Department of Energy's (DOE) facilities. These facilities, particularly its nuclear weapons design laboratories and its nuclear material and weapons production facilities, have long been viewed by DOE and the FBI as targets of espionage and other threats. Recent revelations of the possible loss of nuclear weapons design and other classified information to foreign countries have focused renewed attention on the effectiveness of security at DOE'S facilities and have prompted concerns at high levels in the government,

including the Administration and the Congress. To protect its facilities from security threats, DOE created a multifaceted, defense-in-depth security strategy. Under such a strategy, various lines of defense are used to protect classified and sensitive information, nuclear materials, and equipment. Over the last 20 years, we have performed numerous reviews of security that, unfortunately, Mr. Chairman, show series weaknesses in many of the lines of defense that have lead to loss of classified or sensitive information and technology.

Nuclear Nonproliferation Status of Transparency Measures for U.S. Purchase of Russian Highly Enriched Uranium

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Abstract: As you requested, this report examines (1) the transparency measures that are in place, (2) whether these measures ensure that the nonproliferation objectives of the agreement are met, and (3) the proposals for additional transparency measures. This report is the unclassified version of a classified report that we issued to you on July 8, 1999. In addition to information on these three objectives, the classified report included information on whether the transparency measures ensure that the arms control objectives of the agreement-that the highly enriched uranium that is purchased by the United States is extracted from dismantled Russian nuclear weapons are met.

Nuclear Safety: Information on the International Nuclear Regulators Association

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Abstract: The United States currently participates in and expends funds on numerous organizations dealing with international nuclear safety. Several U.S. government agencies, including the Nuclear Regulatory Commission (NRC), take part in one or more of these organizations. One of these organizations, the International Nuclear Regulators Association, was established in 1997 as an informal group for senior regulators to exchange ideas and views on issues related to nuclear safety and regulation. Members include the Chairman of the NRC from the United States and the equivalent position in seven other countries- %Canada, France, Germany, Japan, Spain, Sweden, and the United Kingdom. The Association's members selected the former Chairman of the NRC, who was a chief proponent of the Association, to serve as its first chairman, a position that she held until May 1999. You have expressed concern about NRC's participation in these

organizations, particularly the International Nuclear Regulators Association, because, among other things, this association may duplicate the activities carried out under the Convention on Nuclear Safety, which was ratified by the U.S. Senate in March 1999. Accordingly, you asked that we provide information on (1) the Association's activities since it was created, (2) U.S. costs to support NRC's participation in the Association, (3) the views of NRC's commissioners and others on the benefits of the Association, and (4) other groups and activities that promote nuclear safety and the extent to which these groups duplicate the work of the Association.

Proliferation of Weapons of Mass Destruction: A Policy in Search of Direction

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Abstract: The list of countries possessing or building weapons of mass destruction (WMD) programs is growing, indicating that the traditional non- proliferation regimes of the Cold War era may have slowed but could not prevent the proliferation of WMD. The worldwide diffusion of information, globalization, advances in science and technology, and changes in the distribution of world power are creating powerful inducements and opportunities for states to proliferate, and devaluing traditional non-proliferation measures. Nuclear testing by India and Pakistan in May 1998 was not simply a non-proliferation policy failure. Rather, it was the predictable outcome of complex world change and porous non-proliferation regimes. Future non-proliferation efforts must target "demand", the inducements and political will to proliferate, more so than "supply", and must focus at the regional level. In a world of continuing proliferation, greater resources should be applied toward counter- proliferation.

Reexamining U.S. Nonproliferation Policy in South Asia

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Abstract: The goal of U.S. policy toward South Asia has been to preclude the proliferation of nuclear weapons and the means to deliver them. In support of these policies, the U.S. Congress enacted a series of legislation to provide automatic sanctions against nation states that violated nuclear proliferation protocols. In May 1998, first India and then Pakistan crossed the nuclear threshold by conducting tests of nuclear weapons, and then declaring themselves nuclear weapon states. These tests brought automatic sanctions from the U.S. government as well as condemnation from the UN Security

Council. In the wake of this development, U.S. policy requires reassessment with an eye toward the short-term need to lessen the likelihood of conflict in South Asia, and with a long-term goal of implementation of the Nuclear Non-Proliferation Treaty (NPT). Several options exist, but the policy option with the greatest likelihood for success is increased engagement by the U.S. in South Asia by using both inducements and sanctions to move India and Pakistan back into compliance with current international nuclear.

Report of the Defense Science Board Task Force on Tritium Production Technology Options

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Abstract: The long-standing national security policy of the U.S. to maintain a robust nuclear deterrent continues to be supported by the Congress and the President. The President has stated that "...our nuclear deterrent posture is one of the most visible and important examples of how U.S. military capabilities can be used effectively to deter aggression and coercion. Nuclear weapons serve as a hedge against an uncertain future, a guarantee of our security commitments to allies, and a disincentive to those who would contemplate developing or otherwise acquiring their own nuclear weapons." U.S. nuclear weapons designs require tritium, an isotope of hydrogen, which has not been produced in the U.S. since 1988, when the last tritium production facility (the K-Reactor at the Savannah River Site) was shut down. This long period without tritium production in the U.S. has been possible because arms control agreements reached in the early 1990s reduced the size of the U.S. nuclear weapons stockpile and because the Department of Energy (DOE) met stockpile tritium requirements by recycling the tritium removed from dismantled nuclear weapons. However, since tritium decays at a rate of 5.5% each year, a dependable source of tritium is required to continue to sustain the U.S. nuclear weapons stockpile to underwrite national security policy and to support arms control goals. The U.S. does maintain a five-year reserve supply of tritium, but this reserve is to be used only in an emergency. Current guidance states the reserve must be restored to its original level within five years of being used. To sustain the START I level, tritium production needs to begin around 2005 at a production capacity of about 3.0 kg/ year. START II levels could be sustained with production of about 1.5 kg/year beginning around 2011.

Understanding China's Nuclear Non-Proliferation Policy

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Abstract: China's nuclear-export activities appear to contradict its official non-proliferation policy. Scrutiny of China's nuclear exports and non- proliferation commitments indicate an adherence to strict "letter-of-the-law" obligations. Yet, China's commitment to the norms and values of the non- proliferation regime is controversial. The difference between China's legal obligations and the international norms of acceptable export behavior is a function of the ambiguity inherent in international treaties and agreements. Stephen Meyer's motivational hypothesis is used to evaluate China's nuclear- export decision-making process. China's motivational profile created by the combination of 16 incentives and disincentives on one hand, and international and domestic conditions on the other. Two case studies are used to illustrate that this profile is not static. As environmental conditions and China's national priorities change, so does China's motivational profile. in the past, U. S. attempts to alter China's nuclear-export activities were successful when the targeted changes were congruent with China's national priorities. For the United States to influence China's future nuclear-export activities, it must first understand China's national priorities and determine the corresponding export motivations that influence China's decision-making process. The United States should then work to change conditions, which would shift the balance of incentives and disincentives, thereby changing the outcome of China's cost benefit calculus.

U.S. Nuclear Nonproliferation Policy: Keeping the Confusion from Becoming Disorganized

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Abstract: A National Security Strategy for a New Century, October 1998, guarantees immutable protection for our citizens, sovereignty, values, and the long term well-being of the nation. All are vital, nation-sustaining interests. We look to our leaders, diplomats, and generals to make good on these Constitutional guarantees. But buried deep in each hydrogen molecule are atoms of raw energy and the building materials of world-busting weapons. Nuclear weapons are an evil reality and one of only a handful of threats to our Democracy. We must pay attention to the currents of international nuclear mercantilism. Fissile materials proliferate for profit. Some of our "friends" sell and our enemies want to buy, for all the wrong reasons. Nuclear proliferation puts our vital interests at-risk as they never have been before. So the U.S. must craft security policies that slow or stop proliferation. This study will address nuclear nonproliferation policies by analyzing theory on strategy in the nuclear age, describe the current nuclear landscape, and define U.S. nonproliferation policies and their effectiveness. The conclusion being that the U.S. must refine its policies before rogue nations Iran and Iraq tip missiles with a nuclear warhead and unleash nuclear thunderstorms.

When Sukarno Sought the Bomb: Indonesian Nuclear Aspirations in the Mid-1960s

http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=TR_U2&search.DOC_TEXT=&search.ADNUMBER.TEXT=&search.TITLE.TEXT=&search.PERS_AUT.TEXT=&search.CORP_AUT.TEXT=&search.SRC_CODE.TEXT=&search.DESCRIPT.TEXT=%22nuclear+proliferation%22&search.REP_DATE.GTEDATE=1999-01-01&search.REP_DATE.LTEDATE=1999-12-31&search.ABSTRACT.TEXT=&search.FLD_GROUPS.TEXT=&search.CONT_NUMBER.TEXT=&search.DESC_NOTE.TEXT=&search.IDENTS.TEXT=&secondorderby=&numrecords=250&fuzzy=0

Abstract: Proponents of nuclear nonproliferation, such as the United States, seek to develop policies that address the root causes of nuclear proliferation. The discipline of international relations aids in this effort by providing theories that attempt to explain why states choose to build nuclear weapons. Most theories simplify the process of proliferation by using only one of three generally accepted explanations: security, domestic politics, or norms. The case of Indonesia, however, illustrates that proliferation is best explained by investigating all three dimensions as well as the role of technology. This thesis evaluates competing theories of nuclear proliferation using a historical case study of Indonesia's aspirations to acquire nuclear weapons during 1964- 1965, and supports the view that multiple variables are necessary to explain the spread of nuclear weapons. As evidence, this thesis examines Indonesian President Sukamo's little-known nuclear aspirations in the mid-1960s. Although Sukamo was ultimately unsuccessful in his effort to acquire atomic weapons, his decision to seek them was influenced by a variety of factors that included Indonesia's security needs, domestic political considerations, norms, and available nuclear energy technology.

Workshop Proceedings for USAF Institute for National Security Studies: Combatting Fissile Materials Smuggling Workshop #5, Held in Dublin, California, 3-4 February 1998

http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=tr_u2&keyfieldvalue=ADA365400&searchterms=%28DESCRIPT%20CONTAINS%20%27biological%20Warfare%27%20%20AND%20REP_DATE%20%3E%3D%20DATE%20%271999-01-01%27%20AND%20REP_DATE%20%3C%3D%20DATE%20%271999-10-20%27%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR_U2%20%20WHERE%20%28DESCRIPT%20CONTAINS%20%27biological%20Warfare%27%20%20AND%20REP_DATE%20%3E%3D%20DATE%20%271999-01-01%27%20AND%20REP_DATE%20%3C%3D%20DATE%20%271999-10-20%27%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=15&max=25&searchid=94052979123888

Abstract: In February 1998, the Air Force INSS sponsored the fifth workshop entitled, “Combatting Fissile Material Smuggling.” This Workshop permitted more than 60 representatives from government, academic, and private industry to exchange information regarding the status of fissile material smuggling: evaluation of the severity of the threat and apparent lull in activity, discussion of domestic programs designed to prevent or counter fissile material smuggling, technical aspects of the prevention of nuclear smuggling, international cooperation and training to deter nuclear smuggling, and response programs. A key element in the successful defense against nuclear smuggling is international cooperation.

NUCLEAR TESTING

Nuclear Weapons: DOE Needs to Improve Oversight of the $5 Billion Strategic Computing Initiative

http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=TR_U2&search.DOC_TEXT=&search.ADNUMBER.TEXT=&search.TITLE.TEXT=&search.PERS_AUT.TEXT=&search.CORP_AUT.TEXT=&search.SRC_CODE.TEXT=&search.DESCRIPT.TEXT=nuclear&search.REP_DATE.GTEDATE=1999-01-01&search.REP_DATE.LTEDATE=1999-12-31&search.ABSTRACT.TEXT=&search.FLD_GROUPS.TEXT=&search.CONT_NUMBER.TEXT=&search.DESC_NOTE.TEXT=&search.IDENTS.TEXT=&secondorderby=&numrecords=100&fuzzy=0

Abstract: Historically, the United States detonated nuclear weapons as the primary method of validating designs and certifying the weapons as safe and reliable. Since September 1992, there has been a moratorium on testing. To ensure the continued safety and reliability of nuclear weapons, the Department of Energy (DOE), which is responsible for designing and building nuclear weapons, developed the 15-year Stockpile Stewardship and Management Program in 1995 as a substitute for actual testing. The stockpile stewardship program employs a variety of means to ensure weapon safety and reliability, including examining weapons, conducting laboratory experiments and tests, and conducting computer modeling and simulation. The computer modeling and simulation part of the program is known as the Accelerated Strategic Computing Initiative. The strategic computing initiative aims to develop advanced computer models that will simulate nuclear explosions in three dimensions with higher resolution than previous models and with a more complete treatment of the underlying basic physics. The initiative is also developing the world's largest and fastest computers, which may ultimately be able to calculate more than 100-trillion mathematical operations per second. The initiative is expected to cost about $5. 2 billion for fiscal years 1996 through 2004. Concerned about the status of the strategic computing initiative, the Chairman, Subcommittee on Military Procurement, House Committee on Armed Services, requested that GAO review the management of the strategic computing initiative, including (1) whether the program is meeting its key milestones and whether its hardware and software developments are adequate to date; (2) whether the program is within its projected budget; and (3) what key technical risks the program faces.

Operations Charioteer, Musketeer, Touchstone, Cornerstone, Aqueduct, Sculpin and Julin. Tests Mill Yard, Diamond Beech, Mighty Oak, Middle Note Mission Ghost, Mission Cyber, Misty Echo, Disk

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Abstract: This report is a personnel-oriented history of DoD participation in underground nuclear weapons testing up to and during Operations Charioteer, Musketeer, Touchstone, Cornerstone, Aqueduct, Sculpin, and Julin; Tests MILL YARD, DIAMOND BEECH, MIGHTY OAK, MIDDLE NOTE, MISSION GHOST, MISSION CYBER, MISTY ECHO, DISKO ELM, MINERAL QUARRY, DISTANT ZENITH, DIAMOND FORTUNE, and HUNTERS TROPHY, 9 October 1985 to 18 September 1992. It is the ninth in a series of historical reports which includes all DoD underground nuclear test participation from 1962 forward. In addition to these historical reports, a restricted distribution report (consisting of several volumes) identifies all DoD and DoD-affiliated participants, military, civilian, and DoD contractors, in both DoD and DOE tests, and lists their individual dose data.

Technical Operations Division - Heritage Remembered

http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=TR_U2&search.DOC_TEXT=&search.ADNUMBER.TEXT=&search.TITLE.TEXT=&search.PERS_AUT.TEXT=&search.CORP_AUT.TEXT=&search.SRC_CODE.TEXT=&search.DESCRIPT.TEXT=nuclear&search.REP_DATE.GTEDATE=1999-01-01&search.REP_DATE.LTEDATE=1999-12-31&search.ABSTRACT.TEXT=&search.FLD_GROUPS.TEXT=&search.CONT_NUMBER.TEXT=&search.DESC_NOTE.TEXT=&search.IDENTS.TEXT=&secondorderby=&numrecords=100&fuzzy=0

Abstract: The Technical Operations Division (TOD) at McClellan Air Force Base will be inactivated on 30 September 1999 after nearly 50 years of vigilance over the nuclear world. TOD was the largest subordinate unit of the Air Force Technical Applications Center, (AFTAC), headquartered at Patrick Air Force Base, Florida. AFTAC is responsible for monitoring several nuclear testing treaties by detecting and identifying nuclear explosions, anywhere on or in the planet. As an integral component of this mission, TOD contributed to the operation of the United States Atomic Energy Detection System (USAEDS), a worldwide network of sensors and environmental samplers, nuclear debris sampling aircraft, and an analytical laboratory system which collect and identify indicators of foreign nuclear activities. This commemorative document chronicles the five decades of TOD's existence.

REGIONAL ARMS CONTROL

The Agreed Framework and KEDO: The Role of the United States in Korean

http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=TR_U2&search.DOC_TEXT=&search.ADNUMBER.TEXT=&search.TITLE.TEXT=&search.PERS_AUT.TEXT=&search.CORP_AUT.TEXT=&search.SRC_CODE.TEXT=&search.DESCRIPT.TEXT=%22nuclear+proliferation%22&search.REP_DATE.GTEDATE=1999-01-01&search.REP_DATE.LTEDATE=1999-12-31&search.ABSTRACT.TEXT=&search.FLD_GROUPS.TEXT=&search.CONT_NUMBER.TEXT=&search.DESC_NOTE.TEXT=&search.IDENTS.TEXT=&secondorderby=&numrecords=250&fuzzy=0

Abstract: The U.S. is moving from a leading security guarantor of the ROK to a mediator of the Korean dispute. The U.S. should understand this fundamental change and adjust its relationship with the ROK and the DPRK to maintain the possibility of Korean

reunification. The Agreed Framework is a deal between the U.S. and the DPRK to stop the DPRK's nuclear program in exchange for energy resources. The Agreed Framework forces the U.S. to go beyond its traditional ROK supportive policy to deal with the DPRK's nuclear ambition. The U.S. should assess the goals of the PRC, ROK, DPRK, and Japan on the Korean peninsula to determine if a change in policy will enhance the probability of a soft landing by the DPRK. To conduct this assessment, the goals of all nations and the DPRK's nuclear ambition have been developed. A graphical summary of the subjective analysis was used to pick the U.S. policy option that shows the best credible and clear logic, and mitigates most effectively any international criticism that may dilute the sound reasoning of future policy. The U.S. should change its current policy to mediate the Korean dispute and increase the probability that all concerned actors meet their goals on the Korean peninsula.

Background Notes

Abstract: The Background Notes, listed below, provide information on geographic entities and international organizations and are updated periodically. Background Notes for some countries are currently unavailable.

Background Notes: Africa

http://www.state.gov/www/background_notes/afbgnhp.html

Background Notes: East Asia and the Pacific

http://www.state.gov/www/background_notes/eapbgnhp.html

Background Notes: Europe and the New Independent States of the Former Soviet Union

http://www.state.gov/www/background_notes/eurbgnhp.html

Background Notes: Middle East and North Africa

http://www.state.gov/www/background_notes/neabgnhp.html

Background Notes: South Asia

http://www.state.gov/www/background_notes/sabgnhp.html

Background Notes: Western Hemisphere

http://www.state.gov/www/background_notes/whabgnhp.html

A Commander's Estimate of the Situation: Kosovo and the Southern Balkans

http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=TR_U2&search.DOC_TEXT=&search.ADNUMBER.TEXT=&search.TITLE.TEXT=&search.PERS_AUT.TEXT=&search.CORP_AUT.TEXT=&search.SRC_CODE.TEXT=&sear

ch.DESCRIPT.TEXT=%22strategic%22&search.REP_DATE.GTEDATE=1999-01-01&search.REP_DATE.LTEDATE=1999-12-31&search.ABSTRACT.TEXT=&search.FLD_GROUPS.TEXT=&search.CONT_NUMBER.TEXT=&search.DESC_NOTE.TEXT=&search.IDENTS.TEXT=&secondorderby=&numrecords=100&fuzzy=0

Abstract: There is a continuing possibility that another Balkan War could erupt in the near future. A massive flood of ethnic Albanian refugees flowing from the Serbian province of Kosovo into Macedonia and the surrounding countries could ignite a violent regional conflict. This nightmare scenario could lead to direct clashes between NATO members Greece and Turkey, as well as Serbia, Macedonia, Albania, and Bulgaria. Thus, the containment of an expanded Balkan War is of paramount concern to NATO and the United States. The current commitment of forces to Bosnia was made in part to ensure the long-term credibility of the Alliance. The prevention of a military confrontation between two member states is even more critical. In addition, the potential humanitarian crisis that could result from continued Serbian aggression in and of itself calls for some sort of international involvement.

NATO and Caspian Security: A Mission Too Far?

http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=TR_U2&search.DOC_TEXT=&search.ADNUMBER.TEXT=&search.TITLE.TEXT=&search.PERS_AUT.TEXT=&search.CORP_AUT.TEXT=&search.SRC_CODE.TEXT=&search.DESCRIPT.TEXT=%22Strategic%22&search.REP_DATE.GTEDATE=1999-01-01&search.REP_DATE.LTEDATE=1999-12-31&search.ABSTRACT.TEXT=&search.FLD_GROUPS.TEXT=&search.CONT_NUMBER.TEXT=&search.DESC_NOTE.TEXT=&search.IDENTS.TEXT=&secondorderby=&numrecords=100&fuzzy=0

Abstract: The West's growing interest in the Caspian Basin and NATO's increasing concern with challenges on its periphery raise an important question for the Atlantic Alliance as it ponders its future role, commitments, and security responsibilities: Given the nature of the West's security interests in the Caspian and Central Asia regions and the potential threats to those interests, what role should NATO play in a broader Western security strategy for the area? This study is part of a larger project on the implications of the changing strategic environment in and around Europe for the United States and NATO.

NATO: Potential Sources of Tension

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Abstract: Throughout the beginning of 1999, NATO has experienced a period of relative internal calm. NATO is threatened neither by a powerful external threat nor by overarching internal strategic differences, and enjoys a degree of support that may indeed

be higher than during the Cold War. Nevertheless, there are potential sources of strain and tension within the Alliance. Such strains collectively could introduce more serious tensions, especially with the imposition of other, unanticipated kinds of tension or crisis. Several long term tensions that existed during the Cold War continue to affect NATO today. These include geography as it affects how an Ally perceives its own interests, French exception and interpretation of its national independence, and the real purpose of the Alliance. Short and medium term issues include: (1) enlargement; (2) strategic concept review; (3) cost issues; (4) European Security and Defense Identity (ESDI); (5) counter proliferation and terrorism; (6) U.S. technology gap; (7) adaptation issues; (8) Greece and Turkey; and the (9) Balkans.

Pakistani Options for Resolution of the Kashmir Dispute

http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=TR_U2&search.DOC_TEXT=&search.ADNUMBER.TEXT=&search.TITLE.TEXT=&search.PERS_AUT.TEXT=&search.CORP_AUT.TEXT=&search.SRC_CODE.TEXT=&search.DESCRIPT.TEXT=nuclear&search.REP_DATE.GTEDATE=1999-01-01&search.REP_DATE.LTEDATE=1999-12-31&search.ABSTRACT.TEXT=&search.FLD_GROUPS.TEXT=&search.CONT_NUMBER.TEXT=&search.DESC_NOTE.TEXT=&search.IDENTS.TEXT=&secondorderby=&numrecords=100&fuzzy=0

Abstract: The Kashmir problem is the oldest unresolved issue on the UN agenda. The present popular uprising in the Indian-held Kashmir has redeemed a forgotten cause; and the nuclear testing by both India and Pakistan sprung the issue back on the international scene, and without resolving this focal issue, a lasting peace in South Asia will remain elusive. This study deals with the issue from its origin to the present with an effort to analyze the problem impartially and dispassionately to provide an objective understanding of the dispute. However, the conclusions drawn and the options recommended are solely from a Pakistani perspective. The study explains the intricacies of this complex border dispute, which over the years has been elevated to an ideological tug of war between India and Pakistan. All of this in the melee of passion for the disputed land, legal claims, moral ascendancy, and a growing Kashmiri nationalism, not to mention the fast changing international backdrop. The paper promotes a fresh approach for Pakistan in order to engage India in a meaningful dialogue on the issue and to involve the international community to fulfill its obligation. The Kashmiri nationalism has emerged as a potent third party to the dispute and thus is addressed. A multipronged approach for Pakistan has been proposed on the covert unilateral and overt bilateral and multilateral planes in order to work on all possible facets of the problem.

The Problem of Dialogue in Northeast Asia

http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=TR_U2&search.DOC_TEXT=&search.ADNUMBER.TEXT=&search.TITLE.TEXT=&search.PERS_AUT.TEXT=&search.CORP_AUT.TEXT=&search.SRC_CODE.TEXT=&search.DESCRIPT.TEXT=%22cold+war%22&search.REP_DATE.GTEDATE=1999-01-01&search.REP_DATE.LTEDATE=1999-12-31&search.ABSTRACT.TEXT=&search.FLD_GROUPS.TEXT=&search.CONT_NUMBER.TEXT=&search.DESC_NOTE.TEXT=&search.IDENTS.TEXT=&secondorderby=&numrecords=100&fuzzy=0

Abstract: Northeast Asia is one of the most volatile regions on the globe, yet dialogue between and among states in the region is limited by differences in culture, history, language, economic strength, political systems and military strength. This paper develops the historical explanations, looking at dialogue channels among China, Japan, the two Koreas, and the United States. As a legacy of the Cold War era and the more distant past, China is viewed with respect and suspicion as the big brother of the region, Japan is odd man out as a historically independent state and a 20th century colonial aggressor, and the two Koreas are locked in a zero-sum game of political legitimacy. More extensive multilateral and bilateral dialogues, which have the potential to lower the risk of conflict, must await the democratization of China, the reunification of Taiwan with the mainland, and the absorption of North Korea into South Korea. Even more time will have to pass before the historical memories of Japanese aggression have faded. In the meantime, the United States will remain the principal stabilizer and interlocutor in Northeast Asia, not by choice but by default.

STRATEGIC ARMS CONTROL

The Campaign for Homeland Defense -- What Do We Really Need

http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=TR_U2&search.DOC_TEXT=&search.ADNUMBER.TEXT=&search.TITLE.TEXT=&search.PERS_AUT.TEXT=&search.CORP_AUT.TEXT=&search.SRC_CODE.TEXT=&search.DESCRIPT.TEXT=%22biological+warfare%22&search.REP_DATE.GTEDATE=1999-01-01&search.REP_DATE.LTEDATE=1999-12-31&search.ABSTRACT.TEXT=&search.FLD_GROUPS.TEXT=&search.CONT_NUMBER.TEXT=&search.DESC_NOTE.TEXT=&search.IDENTS.TEXT=&secondorderby=&numrecords=100&fuzzy=0

Abstract: Since the end of the Cold War, American military planners, government officials and the public have been engaged in intense discussions about the nature of the next threat. Chemical and biological weapons and their effect on where Americans live--the homeland, have occupied a significant part of the debate. The Defense Against Weapons of Mass Destruction (WMD) Act of 1996, better known as the Nunn-Lugar-Dominici Act, tasks the Federal Government with preventing and responding to terrorist incidents involving chemical and biological WMD, and providing enhanced support to improve the capabilities of civilian emergency response. The Department of Defense has responded by creating small, widely scattered response teams. The military response force mission is to support local emergency response teams and provide advice and coordination during WMD contingencies. This program is ineffective, as military teams cannot respond fast enough to be of assistance in a chemical or biological attack. Further study of the nature and effects of the chemical and biological threat indicate military response teams may be a wasted resource due to their late arrival on the scene and potency of the actual attack. However, the role of the military is important in providing training and development programs for civilian first response teams. To align the DoD mission more closely with the intent of the Nunn-Lugar Dominici Act, the conversion of the 470 military response positions to civil defense training positions is proposed. The proposed training program recalls the successfully cooperative efforts of the World War II era War Department Chemical Warfare Service and the Civil Defense program, which

used 323 training personnel at 12 sites to train over two million American civil defense first responders in domestic defense.

Cruise Missile Defense Progress Made but Significant Challenges Remain

http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=tr_u2&keyfieldvalue=ADA363497&searchterms=%28DESCRIPT%20CONTAINS%20%27theater%20missile%27%20%20AND%20REP_DATE%20%3E%3D%20DATE%20%271999-01-01%27%20AND%20REP_DATE%20%3C%3D%20DATE%20%271999-11-03%27%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE%2C%20TABLENAME%28%29%20AS%20TABLE_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR_U2%20%20WHERE%20%28DESCRIPT%20CONTAINS%20%27theater%20missile%27%20%20AND%20REP_DATE%20%3E%3D%20DATE%20%271999-01-01%27%20AND%20REP_DATE%20%3C%3D%20DATE%20%271999-11-03%27%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=5&max=11&searchid=9416632148842

Abstract: Because of the Committee's concerns that the Department of Defense (DOD) might not be giving sufficient emphasis to cruise missile defenses, you asked us to review DOD's progress in establishing adequate mechanisms for coordinating cruise missile defense programs. Our objectives were to (1) identify the organizational structure and mechanisms for coordinating cruise missile defense efforts, (2) determine potential measures of the progress of coordination efforts, (3) assess the progress of coordination using these measures, and (4) identify the challenges that DOD officials believe still must be overcome. Because of your interest, this report focuses on defense against land attack cruise missiles.

Dynamic Targeting and the Mobile Missile Threat

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Abstract: The worldwide proliferation of mobile theater ballistic missiles, and alarming growth of chemical and biological weapons programs, dramatically increases the likelihood that U.S. forces will face this critical threat on future battlefields. The Coalition's failed efforts to thwart Saddam Hussein's use of the mobile Scud missile in the 1991 Gulf War provide some salient lessons for today's Joint Force Commander. Technological advances in U.S. sensors and munitions indicate a significant increase in our ability to locate, track and destroy time sensitive, mobile targets. Emerging operational concepts like Dynamic Targeting, Dynamic Battle Management, and the Rapid Targeting System hold great promise for near real time tasking that will enable assets to consistently operate inside an opponent's decision cycle. Technological superiority alone, however, will not guarantee success against a mobile missile force on today's battlefield. Successful Attack Operations, using joint air power, will require a level of effort and doctrinal approach that is ill defined in contemporary joint publications. The Joint Force Commander must carefully consider threat capabilities and

air power employment options, when apportioning limited theater air assets for emergent dynamic targeting. The synergistic effects of technology and doctrine, in concert with the requisite allocation of airborne assets will provide the Joint Force Commander with the most effective counter to the mobile missile threat.

Ground-Based Intercept of a Ballistic Missile

http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=TR_U2&search.DOC_TEXT=&search.ADNUMBER.TEXT=&search.TITLE.TEXT=&search.PERS_AUT.TEXT=&search.CORP_AUT.TEXT=&search.SRC_CODE.TEXT=&search.DESCRIPT.TEXT=%22ballistic+missile%22&search.REP_DATE.GTEDATE=1999-01-01&search.REP_DATE.LTEDATE=1999-12-31&search.ABSTRACT.TEXT=&search.FLD_GROUPS.TEXT=&search.CONT_NUMBER.TEXT=&search.DESC_NOTE.TEXT=&search.IDENTS.TEXT=&secondorderby=&numrecords=100&fuzzy=0

Abstract: This creative investigation outlines the design and simulation of a Ground-Based Intercept of a Ballistic Missile. The components that made up the simulation were: An Infrared Sensor, Ground-Based Search and Track Radar, Battle Manager and Exo-atmospheric Kill Vehicle. It also identifies the managerial aspects of how a project design and simulation started from the initial plan to the end product, providing a baseline for future projects to follow.

Ground-Based Intercept of a Ballistic Missile: Battle Management

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Abstract: This paper is based on a group simulation project completed for ASE 583, Engineering Simulation. The class designed and simulated a ballistic missile intercept system; technical issues associated with the detection, acquisition, and hit of an incoming missile were primary concerns. Specific components modeled in this simulation include space-based sensors, ground based radars, battle management, the interceptor missile, and the global positioning system (GPS) This particular paper covers the battle management aspects of the simulation. The four main topics of discussion will include infrared data processing, launch message timing, initial track generation, and track updating.

Ground-Based Intercept of a Ballistic Missile Exoatmospheric Kill Vehicle Design and Simulation Considerations

http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=TR_U2&search.DOC_TEXT=&search.ADNUMBER.TEXT=&search.TITLE.TEXT=&search.PERS_AUT.TEXT=&search.CORP_AUT.TEXT=&search.SRC_CODE.TEXT=&search.DESCRIPT.TEXT=%22ballistic+missile%22&search.REP_DATE.GTEDATE=1999-01-01&search.REP_DATE.LTEDATE=1999-12-31&search.ABSTRACT.TEXT=&search.FLD_GROUPS.TEXT=&search.CONT_NUMBER.TEXT=&search.DESC_NOTE.TEXT=&search.IDENTS.TEXT=&secondorderby=&numrecords=100&fuzzy=0

Abstract: This paper details the simulation process followed to design a model of the Kinetic Kill Vehicle portion of a Ballistic Missile Defense simulation. In order to have full knowledge of the system specifications, we went through the design process to find vehicle's propulsion characteristics, center of gravity, and moments of inertia. Using the simulation modeling goals as a guide, the system was then abstracted into a set of desired behaviors. These include ballistic motion, rotational motion, propulsion, vehicle control, communication with the ground, and operation of an on-board sensor. Finally, the paper briefly defines the governing equations used to implement the model in the simulation. Overall, when the presented approach was followed, the simulation process provided a clear progression between steps and a robust method for system modeling.

Ground-Based Intercept of a Ballistic Missile Infrared Sensor Design

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Abstract: This investigation encompasses a study of the operation of infrared detectors and applies this knowledge to the design of a space-based infrared sensor. The design process is illustrated, and sensor technology is explored in order to provide design options at each step. The infrared sensor system designed in this investigation is a component of a ballistic missile defense simulation and is required to sense a ballistic missile threat during the launch and boost phases. The product of this study is a point design that will, with iterative runs of the working simulation, be refined to achieve maximum utility in the integrated architecture. Continual analysis provided as the design matures explains the limits and merits of the system.

Ground-Based Intercept of a Ballistic Missile: Simulation Truth/Model Interface

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Abstract: As the simulation truth/model interface architect, I was charged with generating truth data for an intercontinental ballistic missile in flight. Further, I was responsible for presenting the Ground Based Interceptor simulation in a visual format. I used the Satellite Tool-Kit software to present the results of the simulation in a detailed, graphical format, and I used the supplementary Missile Flight Tool module to model an intercontinental ballistic missile and generate its corresponding truth data.

Interoperability Testing Using the Hardware-in-the-Loop Test Tool

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Abstract: In the past, missile defense testing was limited to models and simulations, which provided maximum flexibility but often lacked realism, or to live fire testing, which provided realism but proved very expensive. Over the years, the Ballistic Missile Defense Organization (BMDO), in concert with its Army and Navy Executive Agents, has developed a test tool that not only bridges the gap between these two methods but has the capability to fully integrate theater missile defense weapons and systems using tactical hardware and software. The Joint National Test Facility (JNTF) currently houses this test tool, called the Theater Missile Defense System Exerciser (TMDSE). This tool is used in Hardware in the Loop (HWIL) tests to evaluate the interoperability and assess the operational performance of the Theater Missile Defense (TMD) Family of Systems (FoS). It stimulates tactical weapon systems in a controlled tested environment, enabling them to react as in live theater conflict. TMDSE is the first platform to provide a ballistic missile defense test capability that is fully interactive, geographically distributed, multi-service, and that operates in real time. HWIL tests using the TMDSE have been successfully conducted nationally with such TMD FoS assets as the Army's Phased Array Tracking to Intercept of Target (PATRIOT) and Theater High Altitude Area Defense (THAAD), the Navy's AEGIS weapon system, the United States Marine Corps (USMC) Theater Ballistic Missile Defense (TBMD) segment, and the Air Force's Aerospace Fusion Center (AFC) (formerly SHIELD), among others. This presentation introduces the BMDO's TMDSE tool and includes actual test data results. In addition, it discusses HWIL tests conducted at the JNTF, the test approach, and the methods employed to achieve: (1) interoperability testing of TMD FoS on the national level, (2) risk mitigation for live fire testing, and (3) significant cost savings.

Microelectronic Status Analysis and Secondary Part Procureability Assessment of the THAAD Weapon System

http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=TR_U2&search.DOC_TEXT=&search.ADNUMBER.TEXT=&search.TITLE.TEXT=&search.PERS_AUT.TEXT=&search.CORP_AUT.TEXT=&search.SRC_CODE.TEXT=&search.DESCRIPT.TEXT=%22theater+missile%22&search.REP_DATE.GTEDATE=1999-01-01&search.REP_DATE.LTEDATE=1999-12-31&search.ABSTRACT.TEXT=&search.FLD_GROUPS.TEXT=&search.CONT_NUMBER.TEXT=&search.DESC_NOTE.TEXT=&search.IDENTS.TEXT=&secondorderby=&numrecords=100&fuzzy=0

Abstract: AMCOM required engineering support in performing microelectronic technology and availability assessments for several hundred items and in assessing the impact of nonavailability on the THAAD weapon system. IOD also required engineering support in performing producibility analyses of the THAAD weapon system. In order to

facilitate the assessment of this system, the Systems Management and Production Laboratory at The University of Alabama in Huntsville Research Institute was tasked to conduct an in-depth analysis as to the life cycle health of the THAAD weapon system's component pants.

Multi-Spectral Shocklayer Radiance from a Hypersonic Slender

http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=TR_U2&search.DOC_TEXT=&search.ADNUMBER.TEXT=&search.TITLE.TEXT=&search.PERS_AUT.TEXT=&search.CORP_AUT.TEXT=&search.SRC_CODE.TEXT=&search.DESCRIPT.TEXT=%22theater+missile%22&search.REP_DATE.GTEDATE=1999-01-01&search.REP_DATE.LTEDATE=1999-12-31&search.ABSTRACT.TEXT=&search.FLD_GROUPS.TEXT=&search.CONT_NUMBER.TEXT=&search.DESC_NOTE.TEXT=&search.IDENTS.TEXT=&secondorderby=&numrecords=100&fuzzy=0

Abstract: The Science and Technology Directorate of the Ballistic Missile Defense Organization is conducting programs to characterize and measure the radiation emitted by the flows about hypersonic vehicles. In addition to understanding the basic physics of high temperature plasmas, ongoing analyses are establishing how such emissions are useful for the detection of theater missile targets using the mid-wave infra-red (MWIR) spectral region (3 - 5 microns) as the baseline and the ultraviolet (UV) or visible wavelengths as a second detection wavelength. The use of a second, shorter wavelength combined with the baseline sensor increases the total information content of the scene. This paper will present a methodology for the calculation of the self-induced, shocklayer radiance for a theater missile defense (TMD)-like interceptor. Predictions of the spectral radiance shocklayer for a realistic missile shape will be given. Finally, operations and instrumentation for an upcoming flight designed to test these predictions will then be discussed. The goal of the experiment is to support the development of a two-color detection strategy based on both short and long wavelengths to provide a robust onboard seeker environment.

National Missile Defense - Has the Time Come?

http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=TR_U2&search.DOC_TEXT=&search.ADNUMBER.TEXT=&search.TITLE.TEXT=&search.PERS_AUT.TEXT=&search.CORP_AUT.TEXT=&search.SRC_CODE.TEXT=&search.DESCRIPT.TEXT=%22arms+control%22&search.REP_DATE.GTEDATE=1999-01-01&search.REP_DATE.LTEDATE=1999-12-31&search.ABSTRACT.TEXT=&search.FLD_GROUPS.TEXT=&search.CONT_NUMBER.TEXT=&search.DESC_NOTE.TEXT=&search.IDENTS.TEXT=&secondorderby=&numrecords=100&fuzzy=0

Abstract: This strategic research paper explores the question of whether the United States should field a National Missile Defense (NMD) system now. In short, has the time come to field such a system? The answer, presently, is no. The NMD issue is explored in four major aspects as follows: the threat, technology, costs, and the impact upon arms control regimes, particularly the ABM treaty.

National Missile Defense - Past as Prologue

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Abstract: The U.S. is about to repeat history again with respect to development and or intermittent deployment of its fifth national missile defense system. While the world and national politico military strategic environment are undergoing continuous change, the relevance of the arguments against National Missile Defense deployment remain strong and will effectively delay or thwart employment of even a limited national missile defense. In short, it is deja' vu. Given the increasingly austere DoD budget and somewhat arbitrary Anti-Ballistic Missile (ABM) Treaty demarcation between theater and national missile defense systems (TMD and NMD), funds projected for NMD development would be better utilized in furthering increasingly capable TMD systems that ultimately become capable of NMD like missions.

On-Orbit Midcourse Space Experiment (MSX) Satellite Environment Flight Experiments

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Abstract: The Midcourse Space Experiment (MSX) satellite was launched on April 24,1996. This paper describes some of the on-orbit contamination experiments executed during the first 21.5 months after launch. There were 14 different experiments that were planned in detail prior to launch and were later carried out using the time provided and the priority given. In addition to those experiments, there were other experiments that were created during the life cycle of the cryogenic telescope such as the SPIRIT 3 End of Cryogenic Operations Test (SECOT). The experiments described in this paper will be only those associated with the quartz crystal microbalance (QCM) instruments. The cryo period included the time from launch through the lifetime of the SPIRIT 3 cryogenic telescope. MSX was launched with the SPIRIT 3 telescope already cold. The cryo period lasted for approximately 10 months and ended when the dewar containing solid hydrogen warmed up to a temperature above 12K. The five QCMs on board the satellite provided data that have been invaluable in characterizing contamination levels around the spacecraft and inside the SPIRIT 3 cryogenic telescope. One of the QCMs, the CQCM, was located internal to the SPIRIT 3 cryogenic telescope and was mounted adjacent to the primary mirror. Real time monitoring of contaminant mass deposition on the primary

mirror was provided by the CQCM, which was cooled to the same temperature as the mirror - approx. 20 K. Thermogravimetric analyses (TGAs) on the CQCM provided insight into the amount and species of contaminants condensed on the SPIRIT 3 primary mirror. The four TQCMs were mounted on the outside of the spacecraft for monitoring contaminant deposition on the external surfaces. The TQCMs operated at approx. -50 deg C and were positioned strategically to monitor the silicone and organic contaminant flux arriving at specific locations.

The Operational Commander and the Trident SSGN

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Abstract: The first four Trident SSBN submarines have been proposed for conversion into conventional missile platforms, or SSGNs, and may arrive in the fleet as soon as 2005. As a formidable theater asset, the SSGN operational strengths and limitations must be addressed by the Department of Defense. Further, the operational concept for this asset must be developed and practiced in order to realize the SSGN's full potential. From the operational commander's perspective, the SSGN will provide operational functions unlike any previous submarine. This paper will prove that the operational commander will be able to overcome command, control and communications difficulties to truly integrate the SSGN within the joint warfighting arena. The commander will surmount these difficulties through revisions to organizational structure and current doctrine, and the expanded use of current communications technology.

Physics of Kinetic Energy Rod Warheads Against TBM Submunition Payloads

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Abstract: New warhead technologies have been designed and developed to obtain high lethality against chemical and biological ballistic missile payloads. These new kinetic energy (KE) rod warheads slowly deploy high density metal penetrators in the target's direction. A high spray density cloud is generated which flood loads the payload inflicting catastrophic damage. These new warhead devices deploy 16 times more mass in the target direction compared to today's blast fragmentation concepts. The idea is to deploy a curtain of rods at low ejection velocities and let the missile and target closing velocities supply the kinetic energy. Testing combined with analytical endgame analysis has shown that a dense spray pattern can obtain high lethality against thick walled

submunitions. Parametric lethality trades show rods with small mass are a better choice compared to fewer larger projectiles. Given, a fixed warhead weight, it is better to have many small rods rather than a few large ones. A new penetration code, which accounts for flood loading, is currently being developed to better model multiple rod impacts. Current endgame shotline codes raytrace each rod through the target, not distinguishing between the first, second or last impacts. A new model is developed which accounts for the first rod penetration compared to the last. This technique takes away target pieces along the penetrated shotline. These pieces are removed and if rods strike near the shotline, they penetrate with the benefit from the first rod. KE rod warheads are extremely lethal against TBM submunition payloads and are viable warhead candidates of future anti-ballistic missile systems.

Probability of Negation for Cruise Missiles Using Least Defendable Routes

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Abstract: Probability of Negation P(sub N) of an enemy missile depends upon its path from its launch point to its intended asset (target). Since Ballistic Missile (BM) trajectories can be predicted uniquely, once the BM's trajectory is known, then its P(sub N) can be calculated in terms of the probabilities of success in the three major functions. Sensor, BM/C4I and Weapon. In contrast, the Cruise Missile (CM) route between its launch point and its intended asset is preplanned by the enemy, based upon his perception of the defense's performance and beddown, so that his CM will take the route of maximum Probability of Survival P(sub S) (corresponding to minimum predicted P(sub N)) while in transit. This particular route is called the Least Defendable Route (LDR). In our method, Poisson density is used to define a risk field (risk per unit route length along source type eight cardinal directions) in terms of Probability of Detection, Engagement Volumes (volumes of space where engagements are feasible) and Engagement Lengths (length between successive engagements for each engagement unit). The LDR between two points is found by directly maximizing P(sub S) through minimizing the cumulative risk defined as the sum of risk along a route connecting those two points using the D'Esopo-Pape Algorithm. The resulting maximum P(sub S) contour map represents the offense's perception of vulnerability. For the same LDR's, one can perform a model simulation, including additional details, and generate the defense's minimum P(sub N) contour map. These two maps (P(sub S) and P(sub N)) provide complementary views for CM defense.

Redefining the Littorals

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Abstract: The U.S. Navy relies heavily upon its ability to operate forward in the littoral regions of the world. Forward-deployed naval forces provide the critical operational connection between peacetime operations and the initial requirements of a developing crisis or major regional contingency. As advanced military technologies become available to existing and potential adversaries, the Navy's ability to maintain freedom of action in these coastal regions will likely become challenged. A force protection scheme for naval operations in the littorals that supports the "full-dimensional protection" concept discussed in Joint Vision 2010 has yet to be developed. Naval force protection must consider the challenges associated with naval operations in confined waters. Increased risk must have managed as maneuver space is restricted and time to react to an adversary's actions is significantly reduced. Forms of power projection need to be developed that match force protection capabilities with the threats and reduce the risk to forces operating forward. Any force protection scheme must remain realistic, flexible, and operationally executable. It necessitates achieving information superiority over the enemy, establishing an extended reach capability for delivering fires, and the operational dispersion of naval forces. The next few years are a critical period for the U.S. Navy as potential adversaries seek to exploit an ever increasing number of military Options offered by technological developments. Technology is accelerating the need for Joint Vision 2010 doctrine development. The supporting operational concepts must be designed so that force protection, and the manner in which forces are organized, achieve a good fit with technology.

Reevaluating Doctrine for Joint Theater Air and Missile Defense

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Abstract: The Joint Theater Air and Missile Defense (JTAMD) threat is evolving rapidly. Such threats include not only Theater Ballistic Missiles, but also cruise missiles and eventually stealth attack aircraft. The U.S. is developing new active defense systems to help meet the challenges of these threats. However, the joint doctrine, which is necessary to integrate these forces, is not keeping pace. Specifically, the doctrine must change in order to take advantage of the overlapping sensor and engagement envelopes that will become more common once these advanced defenses are fielded. This paper explores three proposals that will enable a JFC to better optimize and integrate a JTAMD network of sensors and weapons. First, the JFC should have the option of making the Area Air Defense Commander (AADC) a coequal with the Joint Force Air Component Commander. This option would improve interservice coordination and allocation of active defense units, especially during the deployment and lodgment phase of a

campaign. Second, the Joint Information Control Officer (JICO) must be defined and empowered in order to overcome interservice interoperability problems and establish a theater wide JTAMD picture. Third, in order to deconflict multiple engagements and maintain overlapping sensor coverage as the battle unfolds, the AADC may have to conduct both centralized planning and centralized execution.

Report to Congress on Theater Missile Defense Architecture Options for the Asia-Pacific Region

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Abstract: This report responds to the Fiscal Year 1999 National Defense Authorization Act which directs the Secretary of Defense to carry out a study of the architecture requirements for the establishment and operation of theater ballistic missile defense (TBMD) systems for Japan the Republic of Korea (ROK) and Taiwan that would provide for their defense against limited theater ballistic missile attacks. This report is not intended to discuss the overall development and production issues surrounding TBMD. Likewise, it does not discuss the criteria for arms transfers generally nor any particular issues surrounding transfers to Japan, ROK, or Taiwan. Finally, this report does not provide a comprehensive analysis of theater missile defenses in the Asia-Pacific region. Instead, as requested by Congress, it provides an overview of various TBMD architecture options, which could become available early in the next century. The defense of Japan, the ROK, and Taiwan against ballistic missile attacks is a complex topic and requires substantial in-depth analysis before definitive conclusions can be drawn. The goal of this report is to describe illustrative architecture options for Japan, the ROK, and Taiwan based on each one's unique political and military threat environments.

Reverse Engineering of Foreign Missiles VIA Genetic Algorithm Descriptive

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Abstract: One mission of the National Air Intelligence Center (NAIC) is the reverse engineering of foreign missile weapon systems from incomplete observational data. In the past, intuition and repeated runs of a missile performance model were required to converge to a solution compatible with observed flight characteristics. This approach can be cumbersome and time consuming, as well as being subject to undesirable influences from the analyst's preconceptions and biases. An alternative approach has been created to

apply genetic algorithm (GA) techniques to allow automation of the process, wider exploration of the design space, and more optimal solutions matching the observational data. The GA, when interfaced with a missile performance model, was able to identify a set of missiles that very closely matched the observed performance of a given sample missile. The approach was able to provide the analyst with multiple candidate missiles for further analysis that would have been missed by the previous trial and error approach.

Simulation of TMD Flowfields

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Abstract: The research project is developing simulation methods so that it is possible to design and analyze advanced theater missile defense interceptors. We are focusing on the effects of body geometry on the stability of the boundary layer, in an attempt to delay transition to turbulence on these interceptors. We have used a recently developed computational fluid dynamics method to produce very accurate mean flow fields. We have parallelized a linear stability theory code and have applied it to a number of relevant geometries and flows. We find that increased free-stream enthalpy tends to stabilize the boundary layer and that nose bluntness has a very stabilizing effect. Both of these observations have been made in previous experiments. We plan to continue the analysis of these flows to better understand how to control and delay transition in hypersonic boundary layers.

Statistical Analysis of Atmospheric Properties for Estimation of Infrared Radiance of Ballistic Missiles

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Abstract: Missile defense systems currently under development rely on thermal Infrared (IR) seekers to detect and track incoming ballistic missiles. Atmospheric properties, like temperature and density, can greatly affect the amount of IRE energy that is reflected off a targeted missile. While many models to predict mean atmospheric conditions exist, there are no global models that account for the variability in these properties. This shortcoming makes it difficult to assess uncertainty due to atmospheric conditions. For this reason, a model that is adjusted for known extreme values is needed for use in describing the global behavior of atmospheric parameters. This study is in support of MSIC's development of a Bounded Earth Atmospheric Model (BEAM). This study will

attempt to create such a model through statistical analyses on an existing atmospheric model. It is expected that BEAM will primarily be used by designers of IR sensors used in missile defense systems.

Theater Air and Missile Defense Family of Systems. 8th Annual AIAA/BMDO Technology Conference

http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=TR_U2&search.DOC_TEXT=&search.ADNUMBER.TEXT=&search.TITLE.TEXT=&search.PERS_AUT.TEXT=&search.CORP_AUT.TEXT=&search.SRC_CODE.TEXT=&search.DESCRIPT.TEXT=%22ballistic+missile%22&search.REP_DATE.GTEDATE=1999-01-01&search.REP_DATE.LTEDATE=1999-12-31&search.ABSTRACT.TEXT=&search.FLD_GROUPS.TEXT=&search.CONT_NUMBER.TEXT=&search.DESC_NOTE.TEXT=&search.IDENTS.TEXT=&secondorderby=&numrecords=100&fuzzy=0

Abstract: This report contains briefing charts from the 8th AIAA/BMDO technology readiness conference.

Theater Ballistic Missile Defense, an Achilles Heel for the United States

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Abstract: Theater ballistic missiles are a real and growing threat for U.S. forces. The U.S. is approaching the problem in its traditional manner of developing new high-technology systems to counter the weapons. For at least the next ten years there will likely be a shortage of active defense systems available to the theater commander. First the commander must recognize the potential seriousness of the problem. Ballistic missile defense considerations must be incorporated into operational plans from the outset. Some specific recommendations are given for the commander to be considered as methods to mitigate the shortage of active defense systems.

Theater Ballistic Missile Defense: Who's Fight Is It

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Abstract: Theater Missile Defense (TMD) is a high-profile mission area that sits atop many CINC's Integrated Priority Lists. While all the Services are putting funds into TMD, turf battles have broken out over who should control the TMD battle. The first step in clarifying the missile defense control issue is to disregard the current definitions of

theater missile, attack operations, and active defense. Many of the TMD-specific missions are already conducted as part of counterair operations; however, one mission area defense against in-flight theater ballistic missiles remains unique. That particular mission should be controlled by an anti-ballistic missile expert, responsible to the Area Air Defense Commander.

Theater Missile Defense in World War II - Some Operational Art Considerations

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Abstract: The World War II V-1 and V-2 attacks by Germany were the first effective use of theater missiles, and the first instance of a requirement for theater missile defense (TMD). The Allied response to German cruise (V-1) and ballistic (V-2) missile attacks incorporated all the elements of modern TMD concepts--Active Defense; Passive Defense; Attack Operations; and Command, Control, Communications, Computers, and Intelligence (C4I)--with varying success. Examining this historical case from the perspective of the three basic operational art factors--Space, Time, and Force-and their interrelationships provides some considerations for the operational commander planning and conducting TMD today. Theater missiles will remain a desirable weapon system from an enemy's perspective. Unlike the Second World War, modern conflicts are likely to be short and both sides will essentially "come as they are." The various improvements in theater missile capabilities, coupled with their wider proliferation, will challenge the operational commander even more than before. Nevertheless, improving TMD capabilities will help the operational commander counter the threat. At the same time, coalition partners and host nations will continue to place additional demands on the operational commander. The continued development of TMD doctrine, coupled with improving capabilities and realistic training, should permit an effective TMD response in future conflicts.

Ukraine, Russia, and the Black Sea Fleet Accords

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Abstract: With the breakup of the Soviet Union in 1992, a process began of dividing the commonly held assets of the Soviet republics between newly independent states. The two most important of these new states, Russia and Ukraine, had much to divide between them. Western observers began to worry that disputes between the two countries over the

transfer of Soviet nuclear weapons to Russia, the final legal status of Crimea, and the possession of the Black Sea Fleet (hereafter denoted as "BSF") and its home port of Sevastopol could escalate into a crisis with violent consequences. Yet after five years of public posturing, stalemate, and stop-&-go diplomatic negotiations, Ukraine and Russia reached an agreement, signed by Ukrainian Prime Minister Pavlo Lazarenko and Russian Prime Minister Viktor Chernomyrdin on May 28, 1997. While it was expected that Russian President Boris Yeltsin would sign the Russian-Ukrainian Treaty of Friendship, Cooperation, and Partnership, few senior Ukrainian officials believed that a separate BSF agreement could be reached. It was also surprising that Moscow had accepted conditions similar to those it had rejected in October, 1996.

United States Strategic Command and the Changing Nuclear Threat: Is the Command Prepared for the New Requirements of Strategic Deterrence?

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Abstract: Nuclear weapons have played a critical role as part of strategic deterrence since that first nuclear blast in 1945. While the methods of strategic deterrence have varied through the years, nuclear weapons have been critical for strategic deterrence. With the disintegration of the former Soviet Union and the rise of rogue nations and terrorists groups as well as the proliferation of weapons of mass destruction, new requirements exist for achieving strategic deterrence via nuclear weapons. This paper will review the new requirements for achieving such deterrence via moving from an offensive- based strategic deterrence to a defensive-based strategic deterrence. Methods for achieving a defensive-based strategic deterrence include pursuing continued arms reduction with Russia, modifying the Anti-Ballistic Missile Treaty, the deployment of a ballistic missile defense system, and merging the United States Strategic Command with United States Space Command.

U.S. MILITARY STRATEGY AND TECHNOLOGY

Aerial Coercion as Operational Art: Past Lessons Were Forgotten in Kosovo

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Abstract: This paper examines the evolving use of airpower as the political weapon of choice to achieve U.S. strategic objectives. It focuses on the concept of "aerial coercion,"

which is the unilateral use of air and space power to achieve a desired end state without the credible threat or use of a powerful ground force. The paper begins by evaluating the operational factors of space, force, and time, along with the strategic and operational centers of gravity, from past aerial coercion operations: Operations Linebacker II (1972), Deliberate Force (1995), and Desert Fox (1998). Next, operational lessons learned from these operations are detailed. Finally, the first five weeks of Operation Allied Force (1999) are evaluated using the lessons of past operations as the comparative framework. Allied Force failed to quickly achieve the desired end state because: the stated political objectives could not be attained by airpower alone as Milosevic could "ethnically cleanse" Kosovo before the effects of airpower could destroy Serb ground forces, planners failed to adequately identify and attack the Serb strategic and operational centers of gravity, and airpower was applied gradually instead of using initial overwhelming force. This paper asserts that valuable operational and strategic lessons from previous aerial coercion operations were largely ignored in the planning and execution of Operation Allied Force, leading to frustration in failure to quickly achieve U. S. strategic objectives.

The Air Expeditionary Force A Strategy for an Uncertain Future

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Abstract: Contrary to initial expectations, the end of the cold war has not resulted in a spontaneous outbreak of international peace and stability. While the nuclear threat has diminished, previously suppressed ethnic and nationalistic rivalries have boiled over and become additive to existing trouble spots in Korea and Southwest Asia. In spite of these challenges, defense spending and military forward presence have declined as the lack of a peer competitor has deprived our national security strategy of a definable threat. The Air Expeditionary Force (AEF) attempts to deal with the uncertainty of the current volatile world by providing regional commanders in chief with effects- based packages of airpower that can quickly respond to U.S. national security requirements. This employment strategy attempts to balance international uncertainty with a decreased forward presence and reduced force structure. Recently the Air Force has also touted the AEF as a tool to manage an operational tempo and deployment rate problem that is causing retention difficulties. In his paper Colonel Nowak, USAF, argues that while the AEF is a step in the right direction, the focus appears to be too narrow. Current Air Force AEF planning is oriented toward a conventional force-on-force-style aggression like those aggressions we have seen in Iraq and the former republics of Yugoslavia. However, the most probable use of an AEF will be in a noncombat role, supporting humanitarian or peacekeeping operations. In these "non- traditional" types of AEFs, personnel and leadership skills, as well as the force composition, will be markedly different from a combat-style AEF. The study begins by reviewing the international and domestic context

that has caused the Air Force to focus on expeditionary operations. It continues by discussing the historical roots of the AEF and its current employment philosophy.

The Air Force Role in Developing International Outer Space Law

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Abstract: In this monograph the author describes the United States Air Force resistance to the passage of international conventions (treaties) and the general impact that Air Force opposition had on the development of international law regarding outer space. International outer space law, like other international law, is created by court decisions (international and domestic), passage (negotiation and ratification) of international treaties or conventions, and commonly accepted practices of nations, which in turn become customs. In addition, the publications by scholars of international outer space law have had a substantial impact on the evolution of this body of law.

Applying Sun Tzu's Ancient "Art of War" to the Future

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Abstract: The strategist, Sun Tzu, developed "The Art of War" in China around 500 B.C. His precepts of "warfare" have endured for more than 2000 years and have influenced strategic decision-making and warfare through the 20th century. As the United States enters the 21st century and the information age, it is useful to re-examine Sun Tzu's precepts as they relate to the strategic needs forecasted for 2010 and beyond. This paper first develops a profile of strategic operations expected in the Army After Next time frame, then reviews Sun Tzu's precepts from the perspective of modern diplomacy and warfare, and correlates the precepts with the future characteristics to determine specific areas for further consideration. From a discussion of these areas, seven mandates are called for the U.S. political-military system to prepare for strategic decisions and operational implementation between now and the year 2025.

Are Civilian Munitions Carriers Ready for Two Major Theater Wars?

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Abstract: The United States military relies upon the civilian sector to provide the bulk of transportation assets for the movement of ammunition from the Army's depots to the seaports. Due to numerous factors, this business is extremely competitive and the number of carriers is limited. When the economy is strong, these companies may not have excess capacity ready to respond to the needs of the military. The transition period from peace to war is a time of potential transportation shortages, particularly during the earlier stages. Without the civilian munitions carriers, the ammunition will not make it to the warfighter.

Can We Get There from Here? RMAs, Network-Centric Warfare and the Process of Transformation

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Abstract: Among the hot buzzwords in U.S. military circles at present are the Revolution in Military Affairs (RMA) and Network Centric Warfare (NCW). RMA enthusiasts and technocrats argue that by harnessing emerging information technologies the U.S. can achieve Information Dominance in the battlespace of tomorrow, and fundamentally change the nature of warfare. The RMA is comprised of three elements: technology, doctrine, and organizational adaptation encompassed in the perceived strategic context. Network Centric Warfare envisions the combination of advanced sensors, weapons, and C4I systems from geographically dispersed units networked together into a continuously evolving ecosystem to create a whole greater than the sum of its parts. The results are forces achieving the massing of effects versus the massing of forces, operating with increased speed and synchronized from the bottom up to lock out enemy options while locking in success. Although the means of conducting war will change, the nature of it will not. The key to successfully formulating, implementing, and realizing any RMA will be the investment of our intellectual capital along the path. There is no such thing as the foreseeable future and we must not lock ourselves into a course with no allowable deviation but rather critically assess the who, what when, why, where and how as we move into the 21th century. We cannot wait for someone else to solve the problems for us rather we must all be involved to get there from here.

The CINC's Rapid Reaction Force

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Abstract: The Cold war has ended and we face a new and emerging set of threats and challenges to peace and security. In order to face these new threats the Army must change to better meet the requirements of the Warfighting CINCs. What is called for is the creation of Mobile Strike Forces that are regionally oriented and responsive to the CINCs. These forces will be standing organizations specifically trained, focused and tailored for its rapid reaction role. They will be self-contained, mobile, and lethal, with a robust Command and Control infrastructure. The Mobile Strike Force will be able to react across the spectrum of conflict. In order for the Army to stay relevant to the needs of the CINCs the Army must adapt its organization. The Mobile Strike Force will be the CINC's Rapid Reaction Force of the future.

Command and Control for Operational Maneuver from the Sea, Where Do We Go from Here?

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Abstract: The Navy and Marine Corps are developing doctrine that will enable them to execute maneuver warfare from sea based platforms as part of a concept called "Operational Maneuver from the Sea" (OMFTS). A key part of the effort to develop this innovative doctrine involves establishing effective Command and Control (C2) organizations that will foster success on tomorrow's battlefield. Vying for consideration in future OMFTS doctrine are three different proposals for Command and Control architecture. They include use of the current doctrine as delineated in Joint Pub 3-02 (CATF/CLF); placing amphibious components under a fleet Composite Warfare Commander as a Naval Expeditionary Task Force; or establishment of "supported" and "supported" units by the Commander Joint Task Force. Each of these concepts trace their ancestry to recent periods in military history-World War II, the Cold War era, or the Post Cold War period. To some degree each one mirrors the organization, equipment, and military philosophy in use during their development. When examined and validated against the philosophical approach embodied in OMFTS, only the "supported/supporting" concept has the flexibility to work in the high tempo environment predicated by OMFTS.

Decision Aids and Wargaming for Information Operations

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31&search.ABSTRACT.TEXT=&search.FLD_GROUPS.TEXT=&search.CONT_NUMBER.TEXT=&search.DESC_NOTE.TEXT=&search.IDENTS.TEXT=&secondorderby=&numrecords=100&fuzzy=0

Abstract: Information operations are an essential component of our current and future warfighting strategy as outlined in the latest National Military Strategy and Joint Vision 2010. Simulations such as WARSIM 200 are an important enabler that will permit us to train for and execute this strategy. However, information operations are not included in any current simulation nor are they addressed in any automated decision aids supporting these simulations. The Defense Advanced Research Projects Agency developed a constraint based decision aid to support Course of Action Analysis (COAA) for simulation support at the School of Advanced Military Studies. This decision aid can be extended to represent information operations courses of action. This SRP recommends changes to the decision aid to support the Electronic Warfare (EW) component of Information Operations. It also describes example constraints that can be used to represent the EW component of a division attack scenario. Finally, it recommends a strategy for adding information operations components to joint and army warfighting simulations and for extending the COAA program to address campaign level planning.

Defense Acquisitions: DoD Efforts to Develop Laser Weapons for Theater Defense

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Abstract: This document reviews Department of Defense programs to develop laser weapons for missile defense. It identifies what laser weapons are being considered for missile defense and the coordination among the program offices developing the systems; determine the current status and cost of each system and identify the technical challenges each system faces.

Defense Trade: Department of Defense Savings from Export Sales Are Difficult to Capture

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Abstract: In 1998, the Department of Defense (DOD) and its contractors planned to sell to foreign countries defense equipment, articles, and services worth a total of about $44.3 billion. One of the U.S. government's goals in exporting defense items, as articulated in the 1995 Conventional Arms Transfer Policy, is to allow DOD to meet its defense

requirements at less cost. To determine whether DOD is maximizing this benefit, we reviewed the sales of five major weapon systems-the Hellfire Missile, Advanced Medium Range Air-to-Air Missile (AMRAAM), High Mobility Multipurpose Wheeled Vehicle (HMMWV), Black Hawk Helicopter, and Aegis Weapon System. Specifically, as requested, we determined whether (1) export sales reduced the price of the five weapon systems, (2) DOD waived the requirement to recover nonrecurring research and development and production costs associated with the sales, and (3) DOD included this information when notifying the Congress about the sales or requesting budgetary authority to purchase the weapon systems.

Doctrine (Maybe), Strategy (No): Will the Air Force Implement a Force Protection Program?

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Abstract: The U.S. Air Force's response to the bombing of Khobar Towers in June 1996 was to consolidate and remove our forces to a more isolated (bare base) location in the Saudi desert. While a seemingly logical step, removing our forces from Saudi population areas means that determined future terrorists could employ weapons against U.S. forces without the worry of collateral damage to Saudi nationals. There are many other questions that need answering about our organizational preparedness for a chemical or biological event. For example, in the event of such an attack, is the U.S. civil engineering force trained and equipped for the decontamination of the attacked base and other bases? Does Air Force doctrine include recovery of a base from a chemical attack, or will we evacuate to a new toxic-free area and leave the attacked base and its resources behind? These kinds of questions prompt larger issues.

An Executive Guide to Space: A Starting Point for Understanding Space in the New Millennium

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Abstract: Understanding space and how America plans to use it in the new millennium has captured the attention of our national leadership. Each branch of service within the military has discovered the tremendous warfighting potential of space. Such realization has fired intense doctrinal debates as well as fiscal competition for dwindling resources under the umbrella of this new frontier. These emerging debates and the bottom-line

budget battles have brought an entirely new dimension to our national priorities, which until now have been based on three mediums of warfare: land, sea, and air. Space brings us into the fourth dimension of warfare. As we move our warfighting into this new medium, it is imperative that we develop a fundamental appreciation and understanding of the nuts and bolts' of our current space debate.

Fighting the 20th Century Army into the 21st Century

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Abstract: The Army of the future is undergoing a transformation from a forward deployed "Cold War" army to a power projection force. This transition will eventually result in a fully digitized, more tailorable, rapidly expandable, strategically deployable, and effectively employable organization. Until this transformation is complete, it may require a change to our doctrine and to our tactics, techniques, and procedures on how we integrate digitized and non- digitized systems and organizations into the fight. This paper addresses those possible changes. To leverage the true power of the future battlefield, commanders and their staffs must have a clear understanding on the capabilities and limitations that these new systems possess. Our challenge and primary goal of America's Army in this process is to keep the preeminent war-fighting skills ready and relevant while the Army evolves into the world's premier 21st Century fighting force.

The Future U.S. Military Presence in Asia: Landpower and the Geostrategy of American Commitment

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Abstract: For more than 50 years, countries around the world have looked to the United States for international leadership. Most Asian governments welcome a U.S. presence in the region to help preserve security and stability. They know that an American presence does not mean an occupying force since, if asked, the United States leaves. These countries are reassured by a more or less continuous presence of U.S. forces in a way that the temporary passage or intervention of expeditionary forces will not accomplish. The credibility and deterrent effect of a soldier (sailor, airman, or marine) on the ground represents commitment and stability. Face-to-face contact and "boots on the ground" are the only ways to defeat the "tyranny of distance" and really effect events on land in support of U.S. interests. The nexus of vital U.S. interests in Asia is in Northeast Asia

because of the presence of five traditionally warring powers there: North and South Korea, Japan, Russia, and China.

Hypersonic Weapons Technology for the Time Critical Mobile Ground Threat State-of-the-Art Review

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Abstract: As a result of growing concern about threat time critical or mobile targets (TCMT), the Department of Defense (DoD) has recognized the need for ability to place TCMT, with 1 to 15 minute (or less) dwell times, at risk from surface, subsurface, subsurface and/or airborne platforms. This requires the need for a hypersonic weapons capability to deliver lethal payloads at standoff ranges. This document is intended to address the state-of-the-art in the development of hypersonic system development as well as provide some level of operational effectiveness in order to illustrate the advantages of hypersonic velocities.

In Pursuit of Decisive Strategic Victories; the Need to Enhance the Potential for Successful Strategic Outcomes through Effective Planning for Peace Settlement and Peace Building Descriptive Note

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The record of the United States in decisively achieving its strategic goals following military operations has not been consistent and needs improvement. The cause of this inconsistency is the lack of adequate planning for peace settlement and peace building (PS/PB). Military victories, regardless of how decisive or stunning, do not necessarily equate to strategic victory. Astute PS/PB, following military operations, is critical to successful strategic outcomes since they afford the victor the opportunity to achieve their strategic goals. This is the best opportunity to shape the peace and sustain the long-term achievement of political goals. Examples of U.S. failures to achieve strategic victory include World War I, the Korean War, and the Gulf War. The inadequate planning process for PS/PB is causing other problems in addition to the failure to achieve strategic victory. An example of this is funding problems for the Unified Combatant Commanders. Since they are on-scene at the end of conflict, and civilian agencies are not, DoD Commanders must expend their funds on missions that are more appropriately handled by the civilian agencies. This diminishes the available resources for their missions. The

National Security Council System of Committees for Interagency Coordination should be modified to include Unified Combatant Commanders on the Interagency Coordination Process and make the Department of State responsible for government-wide planning for PS/PB. PDD#56 should be amended to include armed conflict in the categories eligible for Interagency Coordination, especially PS/PB following an end to the conflict.

Interpreting Shadows: Arms Control and Defense Planning in a Rapidly Changing Multi-Polar World

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Abstract: The focus of arms control is changing. It now deals with issues affecting all nations and not just the super powers. A new framework for approaching non-proliferation of weapons of mass destruction and arms control could focus on a two-fold policy initiative. The first policy would be a new strategic "triad" built around conventional capability including rapidly deployable forces, regional ballistic missile defense, and long-range precision- strike capability. The second policy would employ an information strategy using the current diplomatic initiatives that appear to be the most productive, or unilateral and multilateral export controls, military assistance in the form of infrastructure, and confidence building measures. Continued success in arms control requires abandoning Cold War policies. Emerging policies will need to appreciate different world views. Good intelligence will be a key factor in the success of any policy orientation and its implementation. The focus needs to change from arms control involving the superpowers to arms control involving everyone.

Just Another Headquarters or the Missing Link to the Theater Air Defense

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Abstract: As the United States attempts to adapt to meet the changing conditions of the twenty-first century, organizational structure is an issue of heated debate. The central issue of the debate is whether the Army's current hierarchical structure will be effective in a twenty-first century environment. Many argue that efficiencies through technological improvement have eliminated the need for many headquarters. However, in October 1998 the United States Army activated a new theater level air defense headquarters, the 32nd Air and Missile Defense Command (AAMDC). This monograph examines whether the AAMDC is necessary for theater Army air and missile defense in a Force 21

environment. The monograph begins by examining the future environment in which theater air defense operations will occur. The Army's Force 21 operational concepts establish the foundation for future air defense operations. The future air threat and counterair doctrine are also discussed. Two alternative organizations are then explained. The alternative organizations are the new AAMDC organization and its immediate predecessor, the echelon above corps Air Defense Artillery brigade. Next, evaluation criteria are established. The criteria are command and control, planning, coordination, and acceptability. The analysis is the preponderance of the work. Finally, the monograph concludes that the AAMDC is for effective theater Army air and missile defense operations.

Long-Range Missiles: Complete and Happy Victory?

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Abstract: This thesis examines the employment of long-range missiles, such as the Tomahawk Land Attack Missile and the Army Tactical Missile System, in U.S. military operations from Operation DESERT STORM to the present. The thesis reviews long-range missile (LRM) employment at the tactical, operational, and strategic levels of war, from the perspective of the question whether LRMs enable the user to compel an enemy to give up his purpose, while minimizing harm to own forces. LRMs are evaluated as a form of indirect fire supporting maneuver, and as a method for intimidation on the Douhetan airpower model. The principal conclusion is that, although LRMs have shown utility as a form of indirect fire to support maneuver, their primary employment has been neither to support maneuver nor to intimidate by themselves. Instead, they have been used in attritional air campaigns which, with one exception, did not seek to capitalize on the attrition inflicted with follow-on exploitation. The thesis reveals that LRM use has mainly been a form of attrition without exploitation, and reinforces current theories that exploitation should be defined and emphasized as a principle of war.

Major Theater Warfare: Still Relevant Through 2010

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Abstract: This report defines and then analyzes the merit of the nation's present policy concerning the conduct of Major Theater War. Using the nation's interests and the elements of power available to achieve those interests as background, it establishes that

our present policy requiring the capability to execute two, nearly simultaneous, Major Theater Wars remains relevant for the near future. This conclusion is reached after first discussing the basis of the policy, and then refuting many of the arguments that criticize our policy concerning Major Theater War.

Moving Targets and Joint Theater Missile Defense Doctrine: Does it Apply to Locating and Engaging the Needle in the Haystack?

http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=TR_U2&database=FT&search.DOC_TEXT=&search.ADNUMBER.TEXT=&search.TITLE.TEXT=Doctrine+%28Maybe%29%2C+Strategy+%28No%29%3A+&search.PERS_AUT.TEXT=&search.CORP_AUT.TEXT=&search.SRC_CODE.TEXT=&search.DESCRIPT.TEXT=&search.REP_DATE.GTEDATE=1999-01-01&search.REP_DATE.LTEDATE=1999-12-31&search.ABSTRACT.TEXT=&search.FLD_GROUPS.TEXT=&search.CONT_NUMBER.TEXT=&search.DESC_NOTE.TEXT=&search.IDENTS.TEXT=&secondorderby=&numrecords=25&fuzzy=0

Abstract: Moving targets are those characterized by substantial mobility. Due to this mobility, targeting information is transient in nature lasting only hours or even minutes. This makes moving targets hard to engage. In the recent past, by the time the target was acquired, identified and targeted, it had relocated making engagement unproductive. Information technologies (network centric and sensor to shooter concepts) are making this sequence of actions faster and making it viable now to target these time critical, moving targets.

A National Military Strategy for the 21st Century

http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=TR_U2&search.DOC_TEXT=&search.ADNUMBER.TEXT=&search.TITLE.TEXT=&search.PERS_AUT.TEXT=&search.CORP_AUT.TEXT=&search.SRC_CODE.TEXT=&search.DESCRIPT.TEXT=%22Strategic%22&search.REP_DATE.GTEDATE=1999-01-01&search.REP_DATE.LTEDATE=1999-12-31&search.ABSTRACT.TEXT=&search.FLD_GROUPS.TEXT=&search.CONT_NUMBER.TEXT=&search.DESC_NOTE.TEXT=&search.IDENTS.TEXT=&secondorderby=&numrecords=100&fuzzy=0

Abstract: This paper examines current policy and recommends considerations for developing a military strategy for the 21st century. It reviews the existing National Security Strategy - (NSS) and current National Military Strategy (NMS) to frame requirements for a future NMS. It will identify what kind of military is required for the future emerging security environment of the new millenium. It will also explore the type of force structure necessary for this changing security environment. Finally and most critically, it will challenge the remnants of the -Cold War apparatus that supported a strategy of containment to determine its relevance for the imperative of engagement.

Naval Space Command, Space Tracks, a Bulletin on Naval Space Issues and Initiatives

http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=TR_U2&database=FT&search.DOC_TEXT=&search.ADNUMBER.TEXT=&search.TITLE.TEXT=outer+space+treaty&search.PERS_AUT.TEXT=&search.CORP_AUT.TEXT=&s

earch.SRC_CODE.TEXT=&search.DESCRIPT.TEXT=&search.REP_DATE.GTEDATE=1999-01-01&search.REP_DATE.LTEDATE=1999-12-31&search.ABSTRACT.TEXT=&search.FLD_GROUPS.TEXT=&search.CONT_NUMBER.TEXT=&search.DESC_NOTE.TEXT=&search.IDENTS.TEXT=&secondorderby=&numrecords=50&fuzzy=0

Abstract not available on this web site.

Network Centric Warfare and the Joint Forces Air Component Commander

http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=TR_U2&search.DOC_TEXT=&search.ADNUMBER.TEXT=&search.TITLE.TEXT=&search.PERS_AUT.TEXT=&search.CORP_AUT.TEXT=&search.SRC_CODE.TEXT=&search.DESCRIPT.TEXT=%22strategic+Warfare%22&search.REP_DATE.GTEDATE=1999-01-01&search.REP_DATE.LTEDATE=1999-12-31&search.ABSTRACT.TEXT=&search.FLD_GROUPS.TEXT=&search.CONT_NUMBER.TEXT=&search.DESC_NOTE.TEXT=&search.IDENTS.TEXT=&secondorderby=&numrecords=100&fuzzy=0

Abstract: The JFACC concept rests on the belief that aircraft possess a unique ability to reach the deep battle and need to be centrally controlled and coordinated. Today, however, the JFACC controls more than just aircraft. The JFACC staff continues to grow to accommodate controlling and coordinating new technologies. In reality, the ability of aircraft to reach and influence the deep battle is no longer unique. It applies to a myriad of weapons, sensors, and information. A network centric automated system is better suited to control and coordinate these assets. Such a system would be able to absorb the functions of JFACC as a subset of functions performed. The system would be far streamlined and much more efficient than the JFACC. This system is interactive and fuses all information, weapons, and sensors into a common situational picture for all users. This system is a battlespace system.

The Next Convoy War: The American Campaign Against Enemy Shipping in the Twenty-First Century

http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=TR_U2&search.DOC_TEXT=&search.ADNUMBER.TEXT=&search.TITLE.TEXT=&search.PERS_AUT.TEXT=&search.CORP_AUT.TEXT=&search.SRC_CODE.TEXT=&search.DESCRIPT.TEXT=%22strategic+Warfare%22&search.REP_DATE.GTEDATE=1999-01-01&search.REP_DATE.LTEDATE=1999-12-31&search.ABSTRACT.TEXT=&search.FLD_GROUPS.TEXT=&search.CONT_NUMBER.TEXT=&search.DESC_NOTE.TEXT=&search.IDENTS.TEXT=&secondorderby=&numrecords=100&fuzzy=0

Abstract: In the coming century, the United States may find herself at war with a determined and capable opponent. A campaign against Orange commercial shipping will be a facet of the strategic warfare waged against this opponent. The Orange nation may attempt to protect her open-ocean trade routes by convoying her merchant vessels, but will find that American naval power in the age of Network Centric Warfare is too powerful to compete with outside the range of land-based support. The Orange nation will be able to exercise a degree of area denial near her shores, using barrier minefield and land-based air and sea defenses. The American forces will have great difficulty in shutting down the littoral trade routes, due partially to the limitations of weapons technology and partially to the shortage of delivery platforms capable of operation in the

Orange denial area. Advanced weapons technology could help improve the success rate, as could a greater attention to offensive naval mining capability. To maximize the impact of the anti-shipping campaign, American forces should attack Orange ports directly. The Orange nation will respond to American successes by shifting her domestic transport mechanisms to air- or land-based vehicles where practical. This shifting will reduce the impact of the American anti-shipping efforts, unless the American forces also take steps to eliminate the alternate transport methods. If escalation concerns prevent strikes against the Orange homeland, the war against Orange domestic commerce may not be "winnable" at all.

Overcoming Uncertainty: U.S. - China Relations in the 21st Century

http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=TR_U2&search.DOC_TEXT=&search.ADNUMBER.TEXT=&search.TITLE.TEXT=&search.PERS_AUT.TEXT=&search.CORP_AUT.TEXT=&search.SRC_CODE.TEXT=&search.DESCRIPT.TEXT=%22strategic%22&search.REP_DATE.GTEDATE=1999-01-01&search.REP_DATE.LTEDATE=1999-12-03&search.ABSTRACT.TEXT=&search.FLD_GROUPS.TEXT=&search.CONT_NUMBER.TEXT=&search.DESC_NOTE.TEXT=&search.IDENTS.TEXT=&secondorderby=&numrecords=100&fuzzy=0

Abstract: Mutual uncertainty colors every aspect of U.S.-China relations. America worries that China will use its growing military power in pursuit of its expanding interests. Beijing fears the U.S. will try to prevent it from achieving its comprehensive modernization goals. Thus, there lingers an omnipresent perception on both sides that the United States and China are on a road to inevitable confrontation. Policy makers and defense planners on each side are, therefore, required to hedge against some future, undefined, military threat from the other which, in turn, feeds mutual distrust. This paper offers a range of policy steps that would work to overcome mutual uncertainty and advance responsibly U.S.-China relations. Changes in the global strategic environment, China's prospects for development, and the full range of vital and important bilateral security issues are explored, including both sides' goals, interests, and strategic perspectives regarding these issues. Bilateral military relations are also addressed, including why and how they should support the overall security relationship. Ultimately, this paper is intended to provide a framework for a balanced debate on China policy that would contribute to improved stability and predictability in U.S.-China relations.

Partnership for Peace: NATO's Future

http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=TR_U2&search.DOC_TEXT=&search.ADNUMBER.TEXT=&search.TITLE.TEXT=&search.PERS_AUT.TEXT=&search.CORP_AUT.TEXT=&search.SRC_CODE.TEXT=&search.DESCRIPT.TEXT=%22cold+war%22&search.REP_DATE.GTEDATE=1999-01-01&search.REP_DATE.LTEDATE=1999-12-31&search.ABSTRACT.TEXT=&search.FLD_GROUPS.TEXT=&search.CONT_NUMBER.TEXT=&search.DESC_NOTE.TEXT=&search.IDENTS.TEXT=&secondorderby=&numrecords=100&fuzzy=0

Abstract: This monograph examines the NATO Alliance and its transition from a 1949 defense security guarantee, between 16 independent nations into a collective security arrangement. The 1991 NATO Summit formalized this shift from an adversarial

relationship between east and west, to one of engagement through Partnership for Peace (PfP) a NATO alliance initiative designed to enhance stability throughout Europe. The focus of this monograph is on the Partnership for Peace initiative that was designed to engage the allies and client states of the former Soviet Union. NATO in 1991 found its Cold War strategic objectives out of balance with the realities of a new European environment. The aim of PfP is to establish a bond between the NATO members and the nations of Eastern and Central Europe, the Balkans, and the Caucasus. It is a political and military consultative process that is based on the framework of the objectives the Euro-Atlantic Partnership Council laid out. These objectives frame the PIP initiative. These are designed to: enhance democratic principles, reinforce the military subordination to civilian control, and support human rights in the former Soviet satellite nations.

Peace Operations from an Intelligence Perspective

http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=TR_U2&search.DOC_TEXT=&search.ADNUMBER.TEXT=&search.TITLE.TEXT=&search.PERS_AUT.TEXT=&search.CORP_AUT.TEXT=&search.SRC_CODE.TEXT=&search.DESCRIPT.TEXT=%22strategic+defense+initiative%22&search.REP_DATE.GTEDATE=1999-01-01&search.REP_DATE.LTEDATE=1999-12-31&search.ABSTRACT.TEXT=&search.FLD_GROUPS.TEXT=&search.CONT_NUMBER.TEXT=&search.DESC_NOTE.TEXT=&search.IDENTS.TEXT=&secondorderby=&numrecords=100&fuzzy=0

Abstract: Military Intelligence (MI) professionals are operating in a dangerous environment-an environment labeled "peace operations." Peace operations range from benign situations to those of war and can be divided into four major types: observation, traditional peacekeeping, 2nd generation peacekeeping and enforcement. Supporting a commander in each of these subcategories can be similar and very different from more traditional support. Nationally, peace operations require a marriage of national and tactical-level collection and analysis-multi-nationally, a merger of unlike systems and doctrine. Belligerents and allies may be easy or hard to identify. End states change. Sources and customers may be nontraditional. This paper presents and examines the unique considerations of intelligence support to peace operations-operations that will be the dominant form of military operations in the next decade.

Restructuring the Armed Forces to Meet U.S. National Security Interests Through 2015

http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=TR_U2&search.DOC_TEXT=&search.ADNUMBER.TEXT=&search.TITLE.TEXT=&search.PERS_AUT.TEXT=&search.CORP_AUT.TEXT=&search.SRC_CODE.TEXT=&search.DESCRIPT.TEXT=%22deterrence%22&search.REP_DATE.GTEDATE=1999-01-01&search.REP_DATE.LTEDATE=1999-12-31&search.ABSTRACT.TEXT=&search.FLD_GROUPS.TEXT=&search.CONT_NUMBER.TEXT=&search.DESC_NOTE.TEXT=&search.IDENTS.TEXT=&secondorderby=&numrecords=250&fuzzy=0

Abstract: Composed primarily of conventional forces, with nuclear deterrent capability, America's military is obsolete for post cold war realities. The United States is the world's only superpower. A credible peer competitor does not exist to challenge the U.S. nor is one expected through the year 2015. Instead, the world has changed to one fraught with

asymmetric threats, which strike at the Achilles heel of U.S. conventional strategy and force structure. Force structure and strategy changes are inevitable as the military struggles with its identity crisis in a world that is changing at an ever-increasing rate. The opportunity now exists to dramatically reduce the size and cost of the armed forces by transferring the bulk of its conventional capability to the reserves, while maintaining lethal and highly mobile units in the active force to deal with asymmetric threats. A revolutionary restructuring of the military not only prepares it to fight the next war, but also recognizes budgetary realities of the years ahead.

Revolution or Evolution: Combined Arms Warfare in the Twenty-First Century

http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=TR_U2&database=FT&search.DOC_TEXT=&search.ADNUMBER.TEXT=&search.TITLE.TEXT=arms+control&search.PERS_AUT.TEXT=&search.CORP_AUT.TEXT=&search.SRC_CODE.TEXT=&search.DESCRIPT.TEXT=&search.REP_DATE.GTEDATE=1999-01-01&search.REP_DATE.LTEDATE=1999-12-31&search.ABSTRACT.TEXT=&search.FLD_GROUPS.TEXT=&search.CONT_NUMBER.TEXT=&search.DESC_NOTE.TEXT=&search.IDENTS.TEXT=&secondorderby=&numrecords=25&fuzzy=0

Abstract: This study investigates the modern changes in organization, concepts and doctrine in view of the recent discussion concerning revolution in military affairs. The concept presented is one that proposes that the changes are evolutionary in nature when compared against certain criteria requisite for true revolutions in military affairs. The characteristics required for a true revolution in military affairs are explained and a historical comparison of the evolution of the United States World War II armored division is used to expound on these characteristics. This study emphasizes the importance of the impact of revolutions in military affairs and their impact on the military as an organization. The study compares the changes now occurring with the established criteria to demonstrate the evolutionary nature of these changes.

A Simplified Method for Predicting Aerodynamics of Multi-Fin Weapons

http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=TR_U2&database=FT&search.DOC_TEXT=&search.ADNUMBER.TEXT=&search.TITLE.TEXT=Simplified+Method+for+Predicting+Aerodynamics+&search.PERS_AUT.TEXT=&search.CORP_AUT.TEXT=&search.SRC_CODE.TEXT=&search.DESCRIPT.TEXT=&search.REP_DATE.GTEDATE=1999-01-01&search.REP_DATE.LTEDATE=1999-12-31&search.ABSTRACT.TEXT=&search.FLD_GROUPS.TEXT=&search.CONT_NUMBER.TEXT=&search.DESC_NOTE.TEXT=&search.IDENTS.TEXT=&secondorderby=&numrecords=25&fuzzy=0

Abstract: A new semiempirical method was developed to compute aerodynamics of multi-fin missile configurations using cruciform missile aerodynamics as a baseline. The method was developed using full Euler Computational Fluid Dynamics codes to compare computations with wind tunnel data bases for cruciform missiles as a function of Mach number, angle of attack, and aspect ratio. The Euler codes were then used for the same free stream conditions and missile configurations except the number of fins were increased from four to six and eight respectively. A table of coefficients was then formed for the aerodynamics of six- and eight-fin configurations compared to that of four-fin cases for use in the aeroprediction code or other semiempirical codes. It was concluded

that this approach worked well except for subsonic Mach numbers at moderate to large angles of attack, where the Euler codes failed to predict the leeward plane flow field adequately. It is believed that full Navier-Stokes solutions could be used to improve upon this semiempirical model. Engineering judgement, in conjunction with low angle-of-attack Euler solutions were used in the regions where Euler solutions were suspect. In comparing the new semiempirical method to a limited amount of wind tunnel data on several configurations, it was concluded that the model worked well at all the conditions where data was available. However, additional wind tunnel data at higher angles of attack on six- and eight-fin configurations is needed before the method can be truly validated.

Space as an Area of Responsibility (AOR), Is It the Right Solution

http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=TR_U2&search.DOC_TEXT=&search.ADNUMBER.TEXT=&search.TITLE.TEXT=&search.PERS_AUT.TEXT=&search.CORP_AUT.TEXT=&search.SRC_CODE.TEXT=&search.DESCRIPT.TEXT=%22strategic%22&search.REP_DATE.GTEDATE=1999-01-01&search.REP_DATE.LTEDATE=1999-12-31&search.ABSTRACT.TEXT=&search.FLD_GROUPS.TEXT=&search.CONT_NUMBER.TEXT=&search.DESC_NOTE.TEXT=&search.IDENTS.TEXT=&secondorderby=&numrecords=100&fuzzy=0

Abstract: United States Commander in Chief Space (USCINCSPACE) has advocated the need to designate space as an Area of Responsibility (AOR) in order for him to have the authority to fulfill his assigned responsibilities. However, upon examining the Unified Command Plan it becomes evident that designating space as an AOR provides USCINCSPACE no additional authority or ability to accomplish his assigned missions of space control, force protection, or conduct space operations. Designating space as an AOR would likely result in undesirable consequences. If space were designated an AOR it could be perceived by other countries as the U.S. intention of militarizing space, constituting a departure from decades old policy of using space for peaceful purposes. This action in turn could then instigate a space based weapons race or complicate the proliferation of weapons of mass destruction (WMD) to space. U.S. Space Command (USSPACECOM) can best ensure space control by non-space based weapons. Use of these types of weapons would ensure space protection and access for the U.S. and be capable of denying space access to enemies when needed, while avoiding the perception of militarizing space. To enhance USCINCSPACE's ability to meet his responsibilities, he needs the authority to better manage space personnel and space assets. U.S. Special Operations Command (USSOCOM) provides an ideal model that USSPACECOM should implement to achieve this. If implemented, it would give USSPACECOM the unique authority to manage space orientated personnel careers. It would also give him the authority to execute his own budget, providing increased authority to shape space forces, insure interoperability and provide the best possible space support to the war fighters.

Strike Force in the Next War

http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=TR_U2&search.DOC_TEXT=&search.ADNUMBER.TEXT=&search.TITLE.TEXT=&search.PERS_AUT.TEXT=&search.CORP_AUT.TEXT=&search.SRC_CODE.TEXT=&search.DESCRIPT.TEXT=%22peacetime%22&search.REP_DATE.GTEDATE=1999-01-01&search.REP_DATE.LTEDATE=1999-12-

31&search.ABSTRACT.TEXT=&search.FLD_GROUPS.TEXT=&search.CONT_NUMBER.TEXT=&search.DESC_NOTE.TEXT=&search.IDENTS.TEXT=&secondorderby=&numrecords=100&fuzzy=0

Abstract: This monograph examines current Strike Force initiatives and their potential impact. The purpose of this examination is to determine whether, "Are the proposed Strike Force (SF) mission sets applicable to future war scenarios?" The next ten to fifteen years will find the United States Army involved in conflicts that run the full spectrum of conflict. These conflicts will require a force that can quickly respond but has the lethality normally associated with traditional heavy forces. In 1996, TRADOC began the development of a medium weight force, Strike Force that would be able to respond to the challenges of these conflicts. This monograph uses the 1996 book entitled The Next War written by Casper Weinberger and Peter Schweizer as a vehicle to examine the potential applicability of Strike Force. The Next War contains five well-conceived and plausible future war scenarios. The organizational and operational concepts for Strike Force were inserted into these five scenarios where appropriate and implications drawn from them. TRADOC has identified potentially five mission sets that Strike Force will be capable of conducting: Mission Set; (1) High end decisive operations; (2) Entry operations; (3) Peace enforcement; (4) Deter/ contain crisis; (5) Humanitarian assistance. The monograph used these five missions as a framework for analysis of the Strike Force applications in The Next War. There were fourteen occurrences of Strike Force being utilized in The Next War. These Strike Force applications were limited to the High-end decisive operations, Entry operations, and Deter/contain crisis mission sets. The study concluded that based on the frequency and diverse applications of Strike Force employment during The Next War scenarios, the Strike Force offers the NCA or regional CINC an additional option.

Toward Development of an Integrated Aerospace Power Doctrine

http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=TR_U2&database=FT&search.DOC_TEXT=&search.ADNUMBER.TEXT=&search.TITLE.TEXT=Doctrine+%28Maybe%29%2C+Strategy+%28No%29%3A+&search.PERS_AUT.TEXT=&search.CORP_AUT.TEXT=&search.SRC_CODE.TEXT=&search.DESCRIPT.TEXT=&search.REP_DATE.GTEDATE=1999-01-01&search.REP_DATE.LTEDATE=1999-12-31&search.ABSTRACT.TEXT=&search.FLD_GROUPS.TEXT=&search.CONT_NUMBER.TEXT=&search.DESC_NOTE.TEXT=&search.IDENTS.TEXT=&secondorderby=&numrecords=25&fuzzy=0

Abstract: This thesis discusses the state of the Air Force, decision making factors in the making of military doctrine, the definition of doctrine, Air Force doctrines today, new ways to develop doctrine, including models and hypothesis-research-analysis loops, space doctrine, control of space, space superiority and a call for aerospace power doctrine.

The U.S. Army and Doctrine for Weapons of Mass Destruction: Consequence Management Operations

http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=TR_U2&database=FT&search.DOC_TEXT=&search.ADNUMBER.TEXT=&search.TITLE.TEXT=Doctrine+%28Maybe%29%2C+Strategy+%28No%29%3A+&search.PERS_AUT.TEXT=&search.CORP_AUT.TEXT=&search.SRC_CODE.TEXT=&search.DESCRIPT.TEXT=&search

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Abstract: As the nuclear threat between the United States and the Soviet Union has diminished, new threats now face the nation. The end of the Cold War world brought with it the unleashing of rogue states and terrorist organizations that no longer feel constrained by the superpowers. Coupled with the release of technology worldwide, no nation is risk free from attack on its own soil. While the threat of terrorism in of itself is not new, the threat of the use of weapons of mass destruction (WMD) on American soil creates a new risk to national security. Tasked by Congress, the Department of Defense developed programs and capabilities to deal with consequences of a WMD attack on U.S. soil. This study conducts an analysis of the U.S. Army's current WMD consequence management operations doctrine. The analysis is based on a model developed by Colonel Dennis M. Drew, a former Air Force officer who wrote numerous books and articles concerning military doctrine and strategy. The results of the analysis point to many shortcomings in current Army doctrine. Recommendations are provided to better prepare the Army to fulfill its role in consequence management operations.

United States Strategic Command and the Changing Nuclear Threat: Is the Command Prepared for the New Requirements of Strategic Deterrence?

http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=TR_U2&search.DOC_TEXT=&search.ADNUMBER.TEXT=&search.TITLE.TEXT=&search.PERS_AUT.TEXT=&search.CORP_AUT.TEXT=&search.SRC_CODE.TEXT=&search.DESCRIPT.TEXT=%22arms+control%22&search.REP_DATE.GTEDATE=1999-01-01&search.REP_DATE.LTEDATE=1999-12-31&search.ABSTRACT.TEXT=&search.FLD_GROUPS.TEXT=&search.CONT_NUMBER.TEXT=&search.DESC_NOTE.TEXT=&search.IDENTS.TEXT=&secondorderby=&numrecords=100&fuzzy=0

Abstract: Nuclear weapons have played a critical role as part of strategic deterrence since that first nuclear blast in 1945. While the methods of strategic deterrence have varied through the years, nuclear weapons have been critical for strategic deterrence. With the disintegration of the former Soviet Union and the rise of rogue nations and terrorists groups as well as the proliferation of weapons of mass destruction, new requirements exist for achieving strategic deterrence via nuclear weapons. This paper will review the new requirements for achieving such deterrence via moving from an offensive- based strategic deterrence to a defensive-based strategic deterrence. Methods for achieving a defensive-based strategic deterrence include pursuing continued arms reduction with Russia, modifying the Anti-Ballistic Missile Treaty, the deployment of a ballistic missile defense system, and merging the United States Strategic Command with United States Space Command.

University Research Initiative Program for Combat Readiness

http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=tr_u2&keyfieldvalue=ADA363415&searchterms=%28DESCRIPT%20CONTAINS%20%27biological%20Warfare%27%20%20AND%20REP_DATE%20%3E%3D%20DATE%20%271999-01-01%27%20AND%20REP_DATE%20%3C%3D%20DATE%20%271999-10-20%27%29&SQL=SELECT%20RELEVANCE%28%272%3A4%27%29%20AS%20SCORE

%2C%20TABLENAME%28%29%20AS%20TABLE_NAME%20%2C%20TITLE%2C%20ADNUMBER%2CPAGES%2CMEDIACODE%20FROM%20TR_U2%20%20WHERE%20%28DESCRIPT%20CONTAINS%20%27biological%20Warfare%27%20%20AND%20REP_DATE%20%3E%3D%20DATE%20%271999-01-01%27%20AND%20REP_DATE%20%3C%3D%20DATE%20%271999-10-20%27%29%20ORDER%20BY%20SCORE%20DESC%3B&hit=10&max=25&searchid=94052979123888

Abstract: The University Research Initiative for Combat Readiness includes nineteen (19) research and development projects relevant to combat readiness. Projects being supported by this initiative address 6 major DoD mission areas including: (1) chemical and biological warfare, (2) target acquisition and identification, (3) anti-submarine warfare, (4) combat medicine, (5) biodeterioration, and (6) command, control, and communications. These projects were selected for support based on an existing research capability that could be accelerated to create cost savings to the ONR by bringing results to the field earlier. For the present report period directors of the individual projects report 156 publications in progress, in press, or submitted for publication.

Year 2000 Compliance of the Seawolf Class Submarine Combat System

http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=TR_U2&search.DOC_TEXT=&search.ADNUMBER.TEXT=&search.TITLE.TEXT=&search.PERS_AUT.TEXT=&search.CORP_AUT.TEXT=&search.SRC_CODE.TEXT=&search.DESCRIPT.TEXT=%22nuclear%22&search.REP_DATE.GTEDATE=1999-01-01&search.REP_DATE.LTEDATE=1999-12-03&search.ABSTRACT.TEXT=&search.FLD_GROUPS.TEXT=&search.CONT_NUMBER.TEXT=&search.DESC_NOTE.TEXT=&search.IDENTS.TEXT=&secondorderby=&numrecords=100&fuzzy=0

Abstract: The overall audit objective was to assess the status of Military Department and Defense agency mission critical systems identified by the U.S. Pacific Command and U.S. Forces Korea as being of particular importance to them in attaining compliance with year 2000 conversion requirements. Specifically, we reviewed the progress of each system toward year 2000 compliance, testing and integration of modifications, and contingency plans. For this report, we reviewed the Seawolf Class Submarine Combat System.

Year 2000 Compliance of the Trident Submarine Command and Control System

http://www.dtic.mil/cgi-bin/fulcrum_main.pl?database=TR_U2&search.DOC_TEXT=&search.ADNUMBER.TEXT=&search.TITLE.TEXT=&search.PERS_AUT.TEXT=&search.CORP_AUT.TEXT=&search.SRC_CODE.TEXT=&search.DESCRIPT.TEXT=%22ballistic+missile%22&search.REP_DATE.GTEDATE=1999-01-01&search.REP_DATE.LTEDATE=1999-12-31&search.ABSTRACT.TEXT=&search.FLD_GROUPS.TEXT=&search.CONT_NUMBER.TEXT=&search.DESC_NOTE.TEXT=&search.IDENTS.TEXT=&secondorderby=&numrecords=100&fuzzy=0

Abstract: The overall audit objective was to assess the status of Military Department and Defense agency mission critical systems, identified by the U.S. Pacific Command and U.S. Forces Korea, as being of particular importance to them in attaining compliance with year 2000 conversion requirements. Specifically, we reviewed the progress of each system toward year 2000 compliance, testing and integration of modifications, and

contingency plans. For this report, we reviewed the Trident Submarine Command and Control System, revisions 5.5 and 6. 3.

DEPARTMENT OF DEFENSE
DEFENSE LINK

CHEMICAL AND BIOLOGICAL WARFARE

Nuclear/Biological/Chemical (NBC) Defense Annual Report to Congress

http://www.nbc-med.org/SiteContent/HomePage/WhatsNew/99DefRpt.pdf

The National Defense Authorization Act for Fiscal Year 1994, Public Law No. 103-160, Section 1703 (50 USC 1522), mandates the coordination and integration of all Department of Defense chemical and biological (CB) defense programs. As part of this coordination and integration, the Secretary of Defense is directed to submit an assessment and a description of plans to improve readiness to survive, fight and win in a nuclear, biological and chemical (NBC) contaminated environment. This report contains modernization plan summaries that highlight the Department's approach to improve current NBC defense equipment and resolve current shortcomings in the program.

U.S. MILITARY AND TECHNOLOGY

Department of Defense Annual Report to the President and to Congress

http://www.dtic.mil/execsec/adr_intro.html#1

Abstract: Our strategy will ensure that America continues to lead a world of accelerating change by shaping the emerging security environment to reduce threats and to promote our interests and by responding to crises that threaten our interests. We will execute the strategy with superior military forces that fully exploit advances in technology by employing new operational concepts and organizational structures. And we will support our forces with a Department that is as lean, agile, and focused as our warfighters.

Operational Test and Evaluation (DOT&E)

http://www.dote.osd.mil/reports/FY99/

Abstract: The responsibilities and functions of the Office of the Director, Operational Test and Evaluation (DOT&E) increased significantly in 1999, including assuming Office of the Secretary of Defense (OSD) management of test and evaluation facilities. This introduction reports on those changes, the urgent need for new investment in test and evaluation (T&E), both material and personnel, and on recommendations and plans to address such shortfalls. As in the last two Annual Reports, the main body of this report reviews major military systems in terms of their contributions to *Joint Vision 2010*.

Posture Statement by General Henry H. Shelton Chairman of the Joint Chiefs of Staff

http://www.dtic.mil/jcs/core/Posture99.html

Abstract: “It is an honor to report to the Congress today on the state of the United States Armed Forces. At the outset, I would like to pay tribute to our men and women in uniform. As always, they serve our country selflessly, often far from home and loved ones, defending our Nation and its interests and helping to keep the peace in a still dangerous world. America can — and should — be proud of its soldiers, sailors, airmen, and marines. They represent the United States at its very best.”

The Security Situation in the Taiwan Strait

http://www.defenselink.mil/pubs/twstrait_02261999.html

Abstract: The FY99 Appropriations Bill states that "the Secretary of Defense shall provide to Congress a report…detailing the security situation in the Taiwan Strait. Such a report shall include an analysis of military forces facing Taiwan from the People’s Republic of China, evaluating recent additions to the offensive military capabilities of the People’s Republic of China." The Appropriations Bill also further requires assessment of new challenges to Taiwan’s deterrent forces, "consistent with the commitments made by the United States in the Taiwan Relations Act, Public Law 96-8."

DEPARTMENT OF ENERGY

CHEMICAL AND BIOLOGICAL WARFARE

Building-Scale Chem-Bio Dispersion Modeling for Single to Few Building Complexes

http://library.llnl.gov/BASIS/lof_ext/SDF?AU=&au_o=contains+the+phrase&TITLES=&M088=&M088_o=contains+all&CALL=&KW=chemical+and+biological+&M111=&year=1999&catcode=&form_c=AND&form_ob=YEAR&form_so=DESCEND

Abstract: It is well known that chem-bio agents induce impacts over several spatial scales within an urban setting. While the most severe ramifications from chemical releases are confined to areas relatively close to the source (unless the quantity of the chemical is extremely large), biological releases at small or moderate amounts can be lethal at much farther distances downstream and over a significantly larger area. Thus chem-bio agents need to be tracked both in the near field (close to the source) and out to the far field, potentially many kilometers downwind of the source. The LLNL team is focused on sophisticated computational fluid dynamics (CFD) codes to simulate high resolution flow and agent dispersion around single buildings or few building complexes. We are currently enhancing the model physics in FEM3CB and developing FEM3MP, with the latter employing the massively parallel approach, for application to chem-bio releases. The results from these building-scale models can be used for emergency planning of

special events, vulnerability analyses, and the development of mitigation strategies. A longer term deliverable is to integrate this building-scale prediction capability into a chem-bio emergency response system.

Conceptual Decontamination Decision Process Following a CBW Terrorist Attack

http://library.llnl.gov/BASIS/lof_ext/SDF?AU=&au_o=contains+the+phrase&TITLES=&M088=&M088_o=contains+all&CALL=&KW=cbw&M111=&year=1999&catcode=&form_c=AND&form_ob=YEAR&form_so=DESCEND

Abstract: Lawrence Livermore National Laboratory (LLNL) was tasked to prepare a Conceptual BioDecontamination Decision Process that would be used to determine appropriate actions following a terrorist attack. Figure I illustrates this process and represents a preliminary framework to address key issues, allowing for all parties to address areas where no information is available and/or is limited and that will be needed to make appropriate decisions should such an incident occur. Additionally, LLNL has extended this tasking to include a Conceptual ChemDecontamination Decision Process. Figure 2 illustrates this process and outlines the preliminary framework. It is hoped that these types of decision frameworks will be helpful to decision makers and first-line responders in case of such emergencies.

A Portable System for Nuclear, Chemical Agent and Explosives Identification

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Abstract: The FRIS/PINS hybrid integrates the LLNL-developed Field Radionuclide Identification System (FRIS) with the INEEL-developed Portable Isotopic Neutron Spectroscopy (PINS) chemical assay system to yield a combined general radioisotope, special nuclear material (SNM), and chemical weapons/explosives (CWE) detection and identification system. The PINS system uses a shuttered neutron source and a high-purity germanium gamma-ray detector. The FRIS system uses the same radiation detection technology and its own analysis software to detect and identify SNM and other radioisotopes. The FRIS/PINS system uses the electromechanically-cooled germanium detector. There is no other currently available integrated technology that can combine an active neutron interrogation and analysis capability for CWE with a passive radioisotope measurement and identification capability for SNM.

NUCLEAR PROLIFERATION

Advanced Research Workshop: Nuclear Materials Safety

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Abstract: The Advanced Research Workshop (ARW) on Nuclear Materials Safety held June 8-10, 1998, in St. Petersburg, Russia, was attended by 27 Russian experts from 14 different Russian organizations, seven European experts from six different organizations,

and 14 U.S. experts from seven different organizations. The ARW was conducted at the State Education Center (SEC), a former Minatom nuclear training center in St. Petersburg. Thirty-three technical presentations were made using simultaneous translations. These two workshops, when viewed together as a set, have addressed most nuclear material aspects of the storage and disposition operations required for excess HEU and plutonium (see Fig. 1, Opening Remarks). As a result, specific experts in nuclear materials safety have been identified, know each other from their participation in the two ARW interactions, and have developed a partial consensus and dialogue on the most urgent nuclear materials safety topics to be addressed in a formal bilateral program on the subject.

Blending Strategy for the Plutonium Immobilization Program

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Abstract: The Department of Energy (DOE) has declared approximately 38.2 tonnes of weapons grade plutonium to be excess to the needs of national security, 14.3 tonnes of fuel- and reactor-grade plutonium excess to DOE needs, and anticipates an additional 7 tonnes to be declared excess to national security needs. To minimize the cost of characterization of the feedstock and to minimize purification processes, a blending strategy will be followed. The levelization of the impurities, the plutonium isotopics, and the actinide impurities will also provide some benefits in the area of proliferation resistance. The overall strategy will be outlined and the benefits of following a blending instead of a purification program will be discussed.

Block-Structured Adaptive Mesh Refinement Algorithm for Diffusion Radiation

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Block-structured meshes provide the ability to concentrate grid points and computational effort in interesting regions of a flow field, without sacrificing the efficiency and low memory requirements of a regular grid. In unsteady calculations each level is advanced at a different timestep, both for greater efficiency and to maintain an optimal Courant condition. Conservation laws are enforced by using locally conservative difference schemes along with explicit synchronization operations between different levels of refinement. We describe a multigrid algorithm for diffusion radiation that we have added to an existing multi-fluid gasdynamics code. Particular attention is given to the appropriate coupling between the fluid energy and the radiation field, and to the form of synchronization between levels required for energy conservation in the diffusion process.

Chemical Durability of Borosilicate and Phosphate Glasses with High Content of Plutonium

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Abstract: In the development of an optimal concept for disposition of fissile materials, the main criteria should include the safety and the protection of the environment from the radiological impacts. One of the possible routes could be a vitrification option, particularly if combined with high-level waste (HLW) treatment [I]. The selection of a vitrification route depends on many factors, including the uniformity of the distribution of Pu in the glasses and their chemical durability.

Detection of Radioactive Materials at Astrakhan

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Abstract: Astrakhan is the major Russian port on the Caspian Sea. Consequently, it is the node for significant river traffic up the Volga, as well as shipments to and from other seaports on the Caspian Sea. The majority of this latter trade across the Caspian Sea is with Iran. The Second Line of Defense and RF SCC identified Astrakhan as one of the top priorities for upgrading with modem radiation detection equipment. The purpose of the cooperative effort between RF SCC and DOE at Astrakhan is to provide the capability through equipment and training to monitor and detect illegal shipments of radioactive materials through Astrakhan. The first facility was equipped with vehicle and rail portal monitoring systems. The second facility was equipped with pedestrian, vehicle and rail portal monitoring systems. A second phase of this project will complete the equipping of Astrakhan by providing additional rail and handheld systems, along with completion of video systems. Associated with both phases is the necessary equipment and procedural training to ensure successful operation of the equipment in order to detect and deter illegal trafficking in radioactive materials. The presentation will described this project and its overall relationship to the Second Line of Defense Program.

From Separations to Reconstitution a Short History of Plutonium in the U.S. and Russia

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During the cold war plutonium was produced in reactors in both the U.S. and Russia. It was then separated from the residual uranium and fission products by a variety of precipitation processes, such as Bismuth Phosphate, Redox, Butex, Purex, etc. in the U.S. and uranium acetate and Purex in Russia. After a period of time in the field, plutonium weapons were recycled and the plutonium re-purified and returned to weapons. Purification was accomplished by a variety of aqueous and molten salt processes, such as

nitric-hydro fluoric acid dissolution followed by anion exchange, Purex modifications, molten salt extraction, electrorefining, etc. in the U.S. and nitric acid dissolution or sodium hydroxide fusion followed by anion exchange in Russia. At the end of the Cold War, plutonium production of weapons-grade plutonium was cut off in the U.S. and is expected to be cut off in Russia shortly after the turn of the century. Now both countries are looking at methods to reconstitute plutonium with fission products to render it no longer useful for nuclear weapons. These methods include immobilization in a ceramic matrix and then encasement in fission product laden glass, irradiation of MOX fuel, and disposal as waste in WIPP in the U.S. and irradiation of MOX fuel in Russia. This paper will detail the contrast between the treatment of plutonium during the cold war and after the cold war was over.

Future Vision of Nuclear Material Information Systems

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Abstract: To address the current and future needs for nuclear materials management and safeguards information, Lawrence Livermore National Laboratory envisions an integrated nuclear information system that will support several functions. The vision is to link distributed information systems via a common communications infrastructure designed to address the information interdependencies between two major elements: Domestic, with information about specific nuclear materials and their properties, and International, with information pertaining to foreign nuclear materials, facility design and operations. The communication infrastructure will enable data consistency, validation and reconciliation, as well as provide a common access point and user interface for a broad range of nuclear materials information. Information may be transmitted to, from, and within the system by a variety of linkage mechanisms, including the Internet. Strict access control will be employed as well as data encryption and user authentication to provide the necessary information assurance. The system can provide a mechanism not only for data storage and retrieval, but will eventually provide the analytical toots necessary to support the U.S. government’s nuclear materials management needs and non-proliferation policy goals.

Gamma-Ray Camera for Arms Control Applications

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Abstract: The Research Institute of Pulse Techniques, in collaboration with the Proliferation Prevention and Arms Control Program at Lawrence Livermore National Laboratory, has constructed a gamma-ray camera for use in arms control agreements such as Mutual Reciprocal Inspections and Warhead Dismantlement Transparency. The camera is designed to have high efficiency (in order to reduce inspection times), moderate resolution (to decrease the intrusiveness of the measurements), and sturdy construction (to allow operation in the types of conditions that might be met during shipment and use at various forward weapons sites). The imaging element consists of a honeycomb or soda-straw lead collimator and a 312-mm-diameter Nal(TI) scintillator

viewed by an array of phototubes. Software was developed to display two- and three-dimensional views of the data and to analyze shape and peak areas. The first model was tuned for plutonium radiation in the 375- to 415-keV energy range. Images from various arrays of point sources were obtained and will be presented.

Geolocation and Route Attribution in Illicit Trafficking of Nuclear Materials

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Abstract: Nuclear forensic analysis is the process by which intercepted illicit nuclear materials and their associated materials, such as containers, are analyzed to provide clues to attribution. The goal of nuclear forensic analysis is to identify attribution indicators in an interdicted nuclear materials sample or its surrounding environment, e.g., container or transport vehicle. These indicators arise from known relationships between material characteristics and illicit activity. Thus, nuclear forensic analysis is more than the characterization of the material, which is simply a determination of the physical nature of the sample. It is convenient to categorize attribution into source and route attribution, and this report deals with route attribution. However, it is important to note that a number of important questions will draw upon both source and route attribution, e.g., identifying the point of loss of control of the nuclear materials.

High-Resolution Gamma-Ray Isotopic Measurements of Uranium and Plutonium Samples at IPPE in Support of Physical Inventory Taking Activities

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Abstract: Measurement of various U and Pu samples by gamma-ray spectrometry were performed at the Institute of Physics and Power Engineering to support physical-inventory-taking activities under the Joint U.S.-Russian MPC&A Program. The resulting data was analyzed by several different methods which included Canberra's MGA9.63 (Pu and MOX analysis) and MGAU (U analysis), EG&G Ortec's MGA++ (Pu and MOX analysis) and U235 (U analysis), and FRAM v2.2 (U and Pu analysis) provided by Los Alamos. The results indicate that all of these codes are capable of performing the isotopic analysis adequately. However, some additional modifications may be required to permit better measurement of some of the more unusual components in the Institute of Physics and Power Engineering (IPPE) inventory to meet the demands of inventory-taking activities.

Immobilization of Excess Weapons Plutonium in Russia

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Abstract: In this paper, we examine the logic and framework for the development of a capability to immobilize excess Russian weapons plutonium by the year 2004. The initial

activities underway in Russia, summarized here, include engineering feasibility studies of the immobilization of plutonium-containing materials at the Krasnoyarsk and Mayak industrial sites. In addition, research and development (R&D) studies are underway at Russian institutes to develop glass and ceramic forms suitable for the immobilization of plutonium-containing materials, residues, and wastes and for their geologic disposal.

International Cooperation in Combating Illicit Trafficking of Nuclear Materials by Technical Means

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Abstract: A consensus has been emerging during the past several years that illicit trafficking of nuclear materials is a problem that needs a more focused international response. One possible component of a program to combat illicit trafficking is nuclear forensics whereby intercepted nuclear materials are analyzed to provide clues for answering attribution questions. In this report we focus on international cooperation that is specifically addressing the development of nuclear forensics. First we will describe the role of the Nuclear Smuggling International Technical Working Group (ITWG) in developing nuclear forensics, and then we will present some specific examples of cooperative work by the Institute for Transuranium Elements of the European Commission with various European states.

Material Transparency Monitoring

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Abstract: The U.S. and the Russian Federation are currently engaged in negotiating or implementing several nuclear arms and nuclear material control agreements. These involve placing nuclear material in specially designed containers within controlled facilities. Some of the agreements require the removal of nuclear components from stockpile weapons. These components are placed in steel containers that are then sealed and tagged. Current strategies for monitoring the agreements involve taking neutron and gamma radiation measurements of components in their containers to monitor the presence, mass, and composition of plutonium or highly enriched uranium, as well as other attributes that indicate the use of the material in a weapon. If accurate enough to be useful, these measurements will yield data containing information about the design of the weapon being monitored. In each case, the design data are considered sensitive by one or both parties to the agreement. To prevent the disclosure of this information in a bilateral or trilateral inspection scenario, so-called information barriers have evolved. These barriers combine hardware, software, and procedural safeguards to contain the sensitive data within a protected volume, presenting to the inspector only the processed results needed for verification. Interlocks and volatile memory guard against disclosure in case of failure. Implementing these safeguards requires innovation in radiation measurement instruments and data security. Demonstrating their reliability requires independent testing

to uncover any flaws in design. This study discusses the general problem and gives a proposed solution for a high resolution gamma ray detection system. It uses historical examples to illustrate the evolution of other successful systems.

Measurement Instrumentation for Monitoring of Excess Plutonium

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Abstract: Attribute and template measurements for the monitoring of excess plutonium will be accomplished with instruments that have been developed in the last few years both in Russia and the United States. These instruments employ high- and low-resolution gamma-ray spectroscopy, gross neutron counting and neutron multiplicity counting. The high-resolution gamma-ray version can measure the ratio attribute. This ratio can identify the presence of weapons-grade plutonium as well as the presence of plutonium. The Russian instrument is called the radiation passport. It consists of both gamma-ray spectroscopy measurements and gross neutron counting. There is a low resolution gamma-ray version based on a Nal gamma-ray detector with a single He-3 neutron detector and a high-resolution gamma-ray version that uses a High Purity Germanium (HPGe) detector with two He-3 neutron detectors. The Russian radiation passport instruments are primarily a template method that can provide continuity-of- knowledge for a monitored item. The high-resolution gamma-ray version can, in addition, measure the Pu isotopic ratio. The United States high resolution gamma-ray system uses the 630- to 670-keV region of the gamma-ray spectrum to measure the Pu isotopic ratio. Neutron multiplicity counting is both a threshold quantity and weapons-quality measurement. The United States low-resolution gamma-ray spectroscopy technique is a NaI based measurement to form a gamma-radiation-based template for item monitoring.

Measurement of Plutonium and Other Actinide Elements at the Center for Accelerator Mass Spectrometry: A Comparative Assessments of Competing Techniques

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Abstract: Low-level measurements of the long-lived actinide isotopes have a number of important applications throughout the DOE complex. These include radiobioassay programs, environmental assessments, characterization of radioactive wastes, evaluation of waste storage and treatment options, environmental remediation, basic research in chemistry and geochemistry, and other specialized nonproliferation and national security applications. As an example, it has been estimated that for the next few decades more than I million radiochemical analyses per year will be needed in support of U.S. efforts to remediate the legacy of radioactive waste generated by weapons production and the nuclear power industry (Crain, 1996). Traditional radiometric counting methods do not have sufficient sensitivity to address many of these requirements. There is also a growing need to evaluate and monitor exposures to DOE workers involved in decommissioning, environmental management and/or remediation of contaminated sites and facilities.

Quantitative measurements based on low-level detection techniques are of particular interest in the validation of radionuclide transport models and improving radiation dosimetry / risk estimates. Quantitative data and information are required to assess the potential health-effects of exposures occurring under special conditions (e.g., resuspens ion/ inhalation of high-specific activity particles), of inhomogeneous radiation exposure and assessment of associated dose distributions to different parts of the body/tissue, of low dose exposure, and to validate and/or develop new and improved dosimetry models.

Plutonium and Uranium Isotopic Analysis: Recent Developments of the MGA++Code Suite

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Abstract: Attribute and template measurements for the monitoring of excess plutonium will be accomplished with instruments that have been developed in the last few years both in Russia and the United States. These instruments employ high- and low-resolution gamma-ray spectroscopy, gross neutron counting and neutron multiplicity counting. The high-resolution gamma-ray version can measure ratio attribute. This ratio can identify the presence of weapons-grade plutonium as well as the presence of plutonium.

Plutonium Behavior in the Environment

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Abstract: The migration of plutonium in the environment depends strongly on its chemical state (e.g. degree of hydrolysis, complex-formation with inorganic and organic chelating agents) and its sorption capacity on soils, colloids and microbes. We have investigated the complexation of Pu (111) with EDTA, a complexing agent present as a contaminant in the mixed organic-radionuclides wastes at U.S. DOE sites and have found that Pu (111) is oxidized to Pu(IV) to form the Pu(IV)-EDTA complex. The uptake of Pu (111) and Pu(IV)EDTA by a strain of Pseudomonas aeruginosa and a strain of Mycobacterium paraforotium was also evaluated under conditions typical of the natural environment. The presence of EDTA stabilized the plutonium in soluble form, decreased its sorption capacity and therefore enhanced its potential migration in the environment. This work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract W-7405-Eng-48.

Plutonium Immobilization Project Development and Testing Technical Project Office Quality Assurance Program Description

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The Plutonium Immobilization Project (PIP) is one of several fissile materials disposition projects managed by the Department of Energy (DOE) Office of Fissile Materials Disposition (OFMD). The PIP is expected to evolve from the current Development and Testing (D&T) effort, to design, to construction, and finally to operations. Overall management and technical management of the D&T effort resides at the Lead Laboratory, Lawrence Livermore National Laboratory (LLNL), through the LLNL Manager, Fissile Materials Disposition Program (FMDP). Day to day project activities are managed by the D&T Technical Project Office (TPO), which reports to the LLNL Manager, FMDP. The D&T TPO consists of the Technical Manager, the TPO Quality Assurance (QA) Program Manager, and TPO Planning and Support Staff.

Plutonium Measurements by Accelerator Mass Spectrometry at LLNL

http://library.llnl.gov/BASIS/lof_ext/SDF?AU=&au_o=contains+the+phrase&TITLES=&M088=&M088_o=contains+all&CALL=&KW=plutonium&M111=&year=1999&catcode=&form_c=AND&form_ob=YEAR&form_so=DESCEND

Abstract: Mass spectrometric methods provide sensitive, routine, and cost-effective analyses of long lived radionuclides. Here we report on the status of work at Lawrence Livermore National Laboratory (LLNL) to develop a capability for actinide measurements by accelerator mass spectrometry (AMS) to take advantage of the high potential of AMS for rejection of interferences. This work demonstrates that the LLNL AMS spectrometer is well-suited for providing high sensitivity, robust, high throughput measurements of plutonium concentrations and isotope ratios.

Portable NDA Equipment for Enrichment Measurements for the HEU Transparency Program

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Abstract: Lawrence Livermore National Laboratory Immobilization Development & Testing organization (LLNL ID&T) is a Participant in the Plutonium Immobilization Project (PIP). The LLNL D&T has lead responsibilities for form characterization and qualification, ceramic form development, process/equipment development with plutonium, and process systems testing and validation for both conversion and immobilization. This work must be performed in accordance with the graded approach of a Quality Assurance (QA) Program. The purpose of this LLNL QAPD is to describe the organization, management processes, QA Controls for Grading, functional responsibilities, levels of authority, and interfaces for those managing, performing, and assessing the adequacy of work.

Prioritizing Like Nuclear Smugglers

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Abstract: An individual or group attempting to smuggle nuclear material out of a country has a choice of what border crossing to use and how to do it. If it is possible to think like a smuggler and determine what preferences one would have, then we could protect those smuggler-preferred border crossings first. Thinking like a smuggler requires that one understand a host of things: who is likely to smuggle and what might they have obtained, where they might have gotten it, and where they would like to deliver or sell it, how they will attempt to pass customs, how they might travel on both sides of the border, and what influences they might have on customs officials. After collecting data on criminology, geography, and much else, it is necessary to paste the data together into scenarios to ensure that self-consistent smuggling plans are created. These lead to counter-smuggling opportunities. Smuggling by amateurs turns out to be of a different class than professional smuggling, and needs to be countered differently. This work also assists in formulating key policy questions useful to guide counter- smuggling efforts. This methodology was developed for DOE/NN-43 for assistance with prioritization within the Second Line of Defense program.

Second Line of Defense Program

http://library.llnl.gov/BASIS/lof_ext/SDW?W%3DKW+PH+WORDS+%27nuclear+%27+AND+year+%3D+1999+ORDER+BY+EVERY+YEAR/Descend%26M%3D1%26R%3DY

Abstract: Since the collapse of the Soviet Union, the prospect of nuclear materials entering the world market has become an ever-increasing threat. The Second Line of Defense (SLD) program was developed by the U.S. Department of Energy's (DOE) Nuclear Transfer and Supplier Policy Division (NN-43) to assist the Russian Federation State Customs Committee (RFSCC) in strengthening its capability to prevent illicit trafficking of nuclear materials across Russia's borders. The SLD program is a natural complement to the Material Protection Control and Accounting (MPC&A) program, which represents a first line of defense against the theft and diversion of nuclear materials. The SLD program is the first U.S.–Russian cooperative program to combat the illicit trafficking of nuclear and nuclear-related materials to would-be proliferators across Russia's borders.

Secure, Transportable, Autonomous Reactor (STAR): A Small, Proliferation-Resistant Reactor System for Developing Countries

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Abstract: The Secure, Transportable, Autonomous Reactor (STAR), is an 'integrated concept for a small, proliferation-resistant nuclear power system capable of meeting the growing power demands of many regions of the developing world. The STAR approach builds on earlier work investigating the features required for implementation of such a system. The STAR approach includes establishing overall system requirements, conducting research into issues common to four reactor concepts (gas, liquid metal, light water and molten salt), and defining and performing the down-selection to a preferred

concept that will serve as the basis for continued development leading to an eventual prototype.

Status of Immobilization of Excess Weapons Plutonium in Russia

http://library.llnl.gov/BASIS/lof_ext/SDF?AU=&au_o=contains+the+phrase&TITLES=&M088=&M088_o=contains+all&CALL=&KW=weapons&M111=&year=1999&catcode=&form_c=AND&form_ob=YEAR&form_so=DESCEND

Abstract: In this paper, we examine the logic and framework for the development of a capability to immobilize excess Russian weapons plutonium by the year 2004. The initial activities underway in Russia, summarized here, include engineering feasibility studies of the immobilization of plutonium-containing materials at the Krasnoyarsk and Mayak industrial sites. In addition, research and development (R&D) studies are underway at Russian institutes to develop glass and ceramic forms suitable for the immobilization of plutonium-containing materials, residues, and wastes and for their geologic disposal.

Thinking Like a Nuclear Smuggler: A Process to Guide Counter Smuggling Efforts

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Abstract: An individual or group attempting to smuggle nuclear material out of a country has a choice of what border crossing to use and how to do it. If it is possible to think like a smuggler and figure out what preferences one would have, then we could protect those smuggler-preferred border crossings first. Thinking like a smuggler requires that one understand a host of things: who is likely to smuggle and what might they have obtained, where they might have gotten it, and where they would like to deliver or sell it, how they will attempt to pass customs, how they might travel on both sides of the border, and what influences they might have on customs officials. After collecting data on criminology, geography, and much else, it is necessary to paste the data together into scenarios to ensure that self-consistent smuggling plans are created. These lead to counter-smuggling opportunities. Smuggling by amateurs turns out to be of a different class than professional smuggling, and needs to be countered differently. This work also assists in formulating key policy questions useful to guide counter-smuggling efforts. This methodology was developed for DOE/NN-43 for assistance prioritization within the Second Line of Defense program.

Trafficking of Nuclear Materials from the Former Soviet Union: News Abstracts

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Abstract: This report was generated to provide a background for understanding the type and variety of smuggling incidents that have been reported. As discussed in the Site Prioritization report, smuggling cases provide insight into the activities of what has been called "amateur smuggling", that is, smugglers who do not belong to a professional smuggling gang. In many instances, the law enforcement officials giving the press release are not familiar with nuclear materials, and give incorrect identification. The other

portions of the information, such as number of individuals involved, places, and modes of operation are likely to be more correct.

Training Options for Countering Nuclear Smuggling

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Abstract: The burden of stopping a nuclear smuggling attempt at the border rests most heavily on the frontline customs inspector. He needs to know how to use the technological tools at his disposal, how to discern tell-tale anomalies in export documents and manifests, how to notice psychological signs of a smuggler's tension, and how to search anything that might hide nuclear material. This means that assistance in the counter-nuclear smuggling training of customs officers is one of the most critical areas of help that the United States can provide. This paper discusses the various modes of specialized training, both in the field and in courses, as well as the types of assistance that can be provided. Training for nuclear customs specialists, and supervisors and managers of nuclear smuggling detection systems is also important, and differs from front-line inspector training in several aspects. The limitations of training and technological tools such as expert centers that will overcome these limitations are also discussed. Training assistance planned by DOE/NN-43 to Russia within the Second Line of Defense program is discussed in the light of these options, and future possibilities for such training are projected.

U.S./Russian Cooperative Efforts to Enhance Nuclear MPC&A at VNIITF, (Chelyabinsk-70)

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Abstract: The work described here is part of an effort called the Nuclear Materials Protection, Control, and Accounting (MPC&A) Program, a cooperative program between the U.S. Department of Energy (DOE) and Russia's Ministry of Atomic Energy (MinAtom). 'Me objective of the program is to reduce the risk -of nuclear proliferation by strengthening MPC&A systems at Russian nuclear facilities. This paper describes that portion of the MPC&A program that is directed specifically to the needs of the All Russian Scientific Research Institute of Technical Physics (VNIITF), also called Chelyabinsk-70. VNHTF is located in the city of Snezhinsk in the Ural mountains, approximately 2000 kin east of Moscow and 100 km south of Ekaterinburg.

U.S. Transparency Monitoring Under the U.S./Russian HEU Purchase Agreement

http://library.llnl.gov/BASIS/lof_ext/SDW?W%3DKW+PH+WORDS+%27nuclear+%27+AND+year+%3D+1999+ORDER+BY+EVERY+YEAR/Descend%26M%3D1%26R%3DY

Abstract: The conversion of Highly Enriched Uranium (HEU) metal to low enriched uranium (LEU) takes place at four Russian sites. HEU metal to oxide processing began in 1994 with shipments of HEU oxide from the Siberian Chemical Enterprise (SChE) to the

Ural Electrochemical Integrated Plant (UEIP) fluorination and blending facility. U.S. transparency monitoring at these facilities began in February 1996. In 1996, fluorination and blending operations began at the Electrochemical Plant (ECP). In 1997, additional HEU metal to oxide was added at the Mayak Production Association (MPA), and additional fluorination and blending operations have been performed at SChE. U.S. transparency monitoring at these facilities is intended to provide confidence that HEU weapons components are received, that the HEU metal is converted to HEU oxide, and that the HEU is blended to LEU prior to shipment to the U.S. Enrichment Corporation (USEC).

Uranium and Plutonium Solution Assays by Transmission-Corrected X-Ray Fluorescence

http://library.llnl.gov/BASIS/lof_ext/SDF?AU=&au_o=contains+the+phrase&TITLES=&M088=&M088_o=contains+all&CALL=&KW=plutonium&M111=&year=1999&catcode=&form_c=AND&form_ob=YEAR&form_so=DESCEND

Abstract: We have refined and tested a previously developed x-ray fluorescence analysis technique for uranium and plutonium solutions that compensates for variations in the absorption of the exciting gamma rays and fluorescent x-rays. Specially designed equipment incorporates a planar intrinsic germanium detector, excitation and transmission radioisotopes, and specimen holder. The apparatus can be inserted into a rubber glove of a glovebox, keeping the apparatus outside and the solutions inside the glovebox, thereby protecting the user and the equipment from possible contamination. An alternate design may be used in chemical reprocessing plants, providing continuous monitoring, by measuring the trans-actinides through stainless steel piping.

NUCLEAR TESTING

Analysis of Seismic Events in and Near Kuwait

http://library.llnl.gov/BASIS/lof_ext/SDF?AU=&au_o=contains+the+phrase&TITLES=&M088=&M088_o=contains+all&CALL=&KW=seismic&M111=&year=1999&catcode=&form_c=AND&form_ob=YEAR&form_so=DESCEND

Abstract: Seismic data for events in and around Kuwait were collected and analyzed. We estimated event moment, focal mechanism and depth by waveform modeling. Results showed that reliable seismic source parameters for events in and near Kuwait can be estimated from a single broadband three-component seismic station. This analysis will advance understanding of earthquake hazard in Kuwait.

Applying Coda Envelope Measurements to Local and Regional Waveforms for Stable Estimates of Magnitude, Source Spectra, and Energy

http://library.llnl.gov/BASIS/lof_ext/SDF?AU=&au_o=contains+the+phrase&TITLES=&M088=&M088_o=contains+all&CALL=&KW=seismic&M111=&year=1999&catcode=&form_c=AND&form_ob=YEAR&form_so=DESCEND

Abstract: Magnitude estimation forms an integral part in any seismic monitoring endeavor. For monitoring compliance of the Comprehensive Nuclear-Test-Ban Treaty, regional seismic discriminants are often functions of. For small-to-moderate magnitude events that cannot be studied by a large regional or global network of stations, there is a need for stable magnitudes that can be obtained from as few as one station. To date, magnitudes based on coda envelopes are by far the most stable because of the coda's averaging properties. Unlike conventional magnitudes which utilize the direct phases, a coda envelope magnitude is not as sensitive to the undesirable effects of source radiation pattern, 3D path heterogeneity, and constructive/destructive interference near the recording site. The stability of the coda comes from a time-domain measurement made over a large portion of the seismogram thereby averaging over the scattered wavefield. This approach has been applied to earthquakes in the western United States where it was found that a single-station coda magnitude was approximately equivalent to an average over a 64 station network which used only the direct waves such as Lg (Mayeda & Walter, JGR, 1996).

Calibration of Seismic Wave Propagation in Kuwait

http://library.llnl.gov/BASIS/lof_ext/SDF?AU=&au_o=contains+the+phrase&TITLES=&M088=&M088_o=contains+all&CALL=&KW=seismic&M111=&year=1999&catcode=&form_c=AND&form_ob=YEAR&form_so=DESCEND

Abstract: The Natural Resources Authority of Jordan (NRA), the USGS and LLNL have a collaborative project to improve the calibration of seismic propagation in Jordan and surrounding regions. This project serves common goals of CTBT calibration and earthquake hazard assessment in the region. These objectives include accurate location of local and regional earthquakes, calibration of magnitude scales, and the development of local and regional propagation models. In the CTBT context, better propagation models and more accurately located events in the Dead Sea rift region can serve as (potentially GT5) calibration events for generating IMS location corrections. The detection and collection of mining explosions underpins discrimination research. The principal activity of this project is the deployment of two broadband stations at Hittiyah (south Jordan) and Ruweishid (east Jordan). These stations provide additional paths in the region to constrain structure with surface wave and body wave tomography. The Ruweishid station is favorably placed to provide constraints on Arabian platform structure. Waveform modeling with long-period observations of larger earthquakes will provide constraints on I -D velocity models of the crust and upper mantle. Data from these stations combined with phase observations from the 26 short-period stations of tile Jordan National Seismic Network (JNSN) may allow the construction of a more detailed velocity model of Jordan.

Case Studies of Geophysical Search Methods Relevant to the Continuation Phase of an On-Site Inspection

http://library.llnl.gov/BASIS/lof_ext/SDF?AU=&au_o=contains+the+phrase&TITLES=&M088=&M088_o=contains+all&CALL=&KW=treaty&M111=&year=1999&catcode=&form_c=AND&form_ob=YEAR&form_so=DESCEND

Abstract: Part 11 of the Protocol of the Comprehensive Test Ban Treaty prescribes the use of geophysical methods such as active seismic surveys and electrical conductivity measurements to search for and locate underground anomalies, including cavities and rubble zones, during the continuation phase of an on-site inspection. In this paper the application of spontaneous potential, magnetotelluric, active seismic, and gas sampling studies at the U.S. Nevada Test Site associated with underground nuclear explosions will be described and discussed in the context of onsite inspections. Spontaneous potential and E-field ratio tellunic methods were found to be effective in some geologic settings but not in others. An example of gas sampling is shown for which radiogenic gas was detected several years after detonation. The case study of the application of active seismic methods illustrates limitations imposed by the use of relatively simple systems in the field. Detection of a deeply-buried cavity or rubble zone will be difficult; results from the application of only a single method will likely be ambiguous. Best results will come from the synthesis of results from a number of widely-varying methods.

Complete Regional Waveform Modeling to Estimate Seismic Velocity Structure and Source Parameters for CTBT Monitoring

http://library.llnl.gov/BASIS/lof_ext/SDW?W%3DKW+PH+WORDS+%27treaty%27+AND+year+%3D+1999+ORDER+BY+EVERY+YEAR/Descend%26M%3D11%26R%3DY

Abstract: Intermediate-period (10-100 s) regional seismic data contain information about the seismic source as well as the velocity structure along the propagation path. Using independently welt constrained source parameters we determine averaged one-dimensional velocity models by matching reflectivity generated synthetic seismograms to the observed data. Once the velocity structure along the path is well known, then one can determine the nature of the source for new events (e.g. earthquake, explosion or collapse) as well as accurate estimates of event size and depth. We are modeling regional waveforms to infer velocity structure and source parameters in the Middle East and North Africa.

DOE CTBT R&D Effort at Livermore: Calibrating to Enhance International Monitoring for Clandestine Nuclear Explosions

http://library.llnl.gov/BASIS/lof_ext/SDW?W%3DKW+PH+WORDS+%27nuclear+%27+AND+year+%3D+1999+ORDER+BY+EVERY+YEAR/Descend%26M%3D1%26R%3DY

Abstract: The Comprehensive Nuclear-Test-Ban Treaty (CTBT), which was signed in 1996 and still needs to be ratified by the United States, forbids all nuclear tests and creates an international monitoring system (IMS) to search for evidence of clandestine nuclear explosions. As specified in the treaty, the IMS will consist of 170 seismic stations that record underground elastic waves, 60 Infrasound stations to record low-frequency sound waves in the air, hydroacoustic stations to record underwater sound waves, and 80 radionuclide stations to record airborne radionuclide gases or particles. The International Data Center (IDC), located in Vienna, receives data from the IMS system and applies standard event screening criteria to any detected events with the objective of characterizing and highlighting events considered to be consistent with natural

phenomena or a non-nuclear man made phenomena. The National Data Center (NDC) for each country must go a step further than the IDC and identify events as consistent with natural phenomena, non-nuclear manmade phenornena, or a banned nuclear test using these monitoring technologies.

Improvement in Seismic Location Using Non-Stationary Bayesian Kriging

http://library.llnl.gov/BASIS/lof_ext/SDF?AU=&au_o=contains+the+phrase&TITLES=&M088=&M088_o=contains+all&CALL=&KW=seismic&M111=&year=1999&catcode=&form_c=AND&form_ob=YEAR&form_so=DESCEND

Abstract: In this study we test the improvement in sparse-network seismic locations achieved with travel-time correction surfaces that are determined using Bayesian kriging and teleseismically constrained calibration events. The test data set is the 1991. Racha aftershock sequence, which occurred in the Caucuses Mountains between the Black Sea and Caspian Sea. Six stations comprise the test network, which is meant to represent a typical station configuration for small events. Sparse network locations, with and without corrections, are compared to well-constrained epicenters determined with a dense local network.

Improving Regional Seismic Event Location through Calibration of the International Monitoring System

http://library.llnl.gov/BASIS/lof_ext/SDF?AU=&au_o=contains+the+phrase&TITLES=&M088=&M088_o=contains+all&CALL=&KW=seismic&M111=&year=1999&catcode=&form_c=AND&form_ob=YEAR&form_so=DESCEND

Abstract: At Lawrence Livermore National Laboratory (LLNL), we are working to help calibrate the 170 seismic stations that are part of the Comprehensive Nuclear-Test-Ban Treaty (CTBT) monitoring network, in order to enhance the network's ability to locate small seismic events. These low magnitude events are likely to be recorded by only the closest of seismic stations, ranging from local to near teleseismic distances. At these distance ranges, calibration statistics become highly nonstationary, challenging us to develop more general statistical models for proper calibration. To meet the goals outlined above, we are developing a general nonstationary framework to accurately calibrate seismic travel-time predictions over the full distance range, from local, to regional, to teleseismic distances. The objective of this framework is to develop valid region-specific corrections for the Middle East, North Africa, and portions of the Soviet Union, to assess our progress towards meeting calibration goals, and to perform cost-benefit analysis for future calibrations. The framework integrates six core components essential to accurate calibration.

In Southwestern Asia: Tectonic Release from the May 11, 1998 Indian Nuclear Tests

http://library.llnl.gov/BASIS/lof_ext/SDW?W%3DKW+PH+WORDS+%27nuclear+%27+AND+year+%3D+1999+ORDER+BY+EVERY+YEAR/Descend%26M%3D1%26R%3DY

Abstract: The seismic signal from the May 11, 1999 underground nuclear explosions in western India provide new data to test regional event analysis techniques that provide

valuable insight into both tectonic processes and for monitoring the Comprehensive Nuclear-Test-Ban Treaty (CTBT). One such technique is regional waveform modeling which can provide information about both the source of seismic waves and the structure they pass through, The technique matches reflectivity generated synthetic seismograms to data, and is most effective if either the source or structure is known independently so the other can be determined by goodness of waveform. fit. Starting with a large May 2 1, 1997 event in central India with a teleseisinically well-constrained depth and focal mechanism, we have used regional waveform modeling in the 10- 100 s period range to determine the average velocity structure to stations NIL, LSA and HYB. In a bootstrap process of fitting earthquakes progressively farther away and at smaller magnitudes and shorter periods we refined both the models and the regions over which the models are valid.

Lessons Learned from the First U.S./Russian Federation Joint Tabletop Exercise to Prepare for Conducting On-Site Inspections under the Comprehensive Nuclear Test Ban Treaty

http://library.llnl.gov/BASIS/lof_ext/SDW?W%3DKW+PH+WORDS+%27nuclear+%27+AND+year+%3D+1999+ORDER+BY+EVERY+YEAR/Descend%26M%3D1%26R%3DY

Abstract: A U.S. /Russian Federation Joint Tabletop Exercise took place in Snezhinsk, Russia, from 19 to 24 October 1998 whose objectives were to examine the functioning of an Inspection Team (IT) in a given scenario, to evaluate the strategies and techniques employed by the IT, to identify ambiguous interpretations of treaty provisions that needed clarification, and to confirm the overall utility of tabletop exercises to assist in developing an effective Comprehensive Test Ban Treaty (CTBT) verification regime. To achieve these objectives, the United States and Russian Federation (RF) agreed that two exercises would be conducted. The first would be developed by the RF, who would act as controller and as the inspected State Party (ISP), while the United States would play the role of the IT. The roles would be reversed in the second exercise; the United States would develop the scenario and play the ISP, while the RF would play the IT. A joint control team, comprised of members of both the U.S. and RF control teams, agreed on a number of ground rules for the two exercises and established a joint Evaluation Team to evaluate both of the exercises against the stated objectives.

LLNL Middle East and North Africa Research Database

http://library.llnl.gov/BASIS/lof_ext/SDW?W%3DKW+PH+WORDS+%27treaty%27+AND+year+%3D+1999+ORDER+BY+EVERY+YEAR/Descend%26M%3D11%26R%3DY

Abstract: The Lawrence Livermore National Laboratory (LLNL) Comprehensive Nuclear-Test-Ban Treaty Research and Development (CTBT R&D) program has made significant progress populating a comprehensive seismic research database (RDB) for seismic events and derived research products in the Middle East and North Africa (ME/NA). Our original ME/NA study region has enlarged and is now defined as an area including the Middle East, Africa, Europe, Southwest Asia, the Former Soviet Union and the Scandinavian/Arctic region. The LLNL RDB will facilitate calibration of all International Monitoring System (IMS) stations (primary and auxiliary) or their

surrogates (if not yet installed) as well as a variety of gamma stations. The RD13 provides not only a coherent framework in which to store and organize large volumes of collected seismic waveforms and associated event parameter information, but also provides an efficient data processing/research environment for deriving location and discrimination correction surfaces and capabilities. In order to accommodate large volumes of data from many sources with diverse formats the RDB is designed to be flexible and extensible in addition to maintaining detailed quality control information and associated metadata.

LLNL's Regional Seismic Discrimination Research

http://library.llnl.gov/BASIS/lof_ext/SDF?AU=&au_o=contains+the+phrase&TITLES=&M088=&M088_o=contains+all&CALL=&KW=seismic&M111=&year=1999&catcode=&form_c=AND&form_ob=YEAR&form_so=DESCEND

Abstract: As part of the Department of Energy's research and development effort to improve the monitoring capability of the planned Comprehensive Nuclear-Test-Ban Treaty international monitoring system, Lawrence Livermore Laboratory (LLNL) is testing and calibrating regional seismic discrimination algorithms in the Middle East, North Africa and Western Former Soviet Union. The calibration process consists of a number of steps: I) populating the database with independently identified regional events; 2) developing regional boundaries and pre-identifying severe regional phase blockage zones; 3) measuring and calibrating coda based magnitude scales; 4a) measuring regional amplitudes and making magnitude and distance amplitude corrections (MDAC); 4b) applying the DOE modified kriging methodology to MDAC results using the regionalized background model; 5) determining the thresholds of detectability of regional phases as a function of phase type and frequency; 6) evaluating regional phase discriminant performance both singly and in combination; 7) combining steps 1-6 to create a calibrated discrimination surface for each stations; 8) assessing progress and iterating. We have now developed this calibration procedure to the point where it is fairly straightforward to apply earthquake-explosion discrimination in regions with ample empirical data. Here we emphasize the results of the above process: station correction surfaces and their improvement to discrimination results compared with simpler calibration methods.

Modeling the Conversion of Hydroacoustic to Seismic Energy at Islands and Continental Margins: Preliminary Analysis of Ascension Island Data

http://library.llnl.gov/BASIS/lof_ext/SDF?AU=&au_o=contains+the+phrase&TITLES=&M088=&M088_o=contains+all&CALL=&KW=seismic&M111=&year=1999&catcode=&form_c=AND&form_ob=YEAR&form_so=DESCEND

Abstract: Seismic stations at islands and continental margins will be an essential component of the International Monitoring System (IMS) for event location and identification in support of Comprehensive Nuclear-Test-Ban Treaty (CTBT) monitoring. Particularly important will be the detection and analysis of hydroacoustic to-seismic converted waves (Tphases) at island or continental margins. Acoustic waves generated by sources in or near the ocean propagate for long distances very efficiently due to the ocean

sound speed channel (SOFAR) and low attenuation. When ocean propagating acoustic waves strike an island or continental margin they are converted to seismic (elastic) waves. For this paper we will focus on validating the finite difference method for modeling T-phases in the ocean and land environments and on modeling T-phases observed by the May 1999 Ascension Island Experiment. A network of broadband seismometers on Ascension Island recorded a large number of offshore airgun shots. The shots occurred at all azimuths around the island and at ranges from 1-45 kin. Measurements of signal amplitude and duration will be made to understand the variability of T-phase behavior on Ascension Island. The sensitivity to topographic slope and island structure will also be investigated.

Rapid Deployment Drilling System for On-Site Inspections under a Comprehensive Test Ban Treaty, Vol. 1: Description, Acquisition, Deployment, and Operation

http://library.llnl.gov/BASIS/lof_ext/SDF?AU=&au_o=contains+the+phrase&TITLES=&M088=&M088_o=contains+all&CALL=&KW=treaty&M111=&year=1999&catcode=&form_c=AND&form_ob=YEAR&form_so=DESCEND

Abstract: The Comprehensive Test Ban Treaty (CTBT) has been signed by many countries, including the United States. The U.S. Senate will start discussions of CTBT ratification in the near future. The Treaty aims to prevent any nuclear explosion from being conducted. A verification system is being implemented. It includes the possibility of On-Site Inspections (OSI) in a country where a suspicious seismic signal has been identified, which could come from a clandestine nuclear test. As part of an OSI, the use of drilling is allowed by the CTBT so as to obtain irrefutable proof of a Treaty violation. Such proof could be in the form of diagnostics of very high gamma radiation levels and high temperatures underground, which could not be explained by a natural source.

Resettlement of Bikini Atoll - U.S. Nuclear Test Site

http://library.llnl.gov/BASIS/lof_ext/SDW?W%3DKW+PH+WORDS+%27nuclear+%27+AND+year+%3D+1999+ORDER+BY+EVERY+YEAR/Descend%26M%3D1%26R%3DY

Abstract: The United States conducted a nuclear testing program at Bikini and Enewetak Atolls in the Marshall Islands from 1946 through 1958. Several atolls, including Bikini, Enewetak, Rongelap, and Utirik, were contaminated as a result of the nuclear detonations. Rongelap and Utirik Atolls were inhabited, and the people on these atolls were exposed to fallout on March 1, 1954 from the BRAVO test. Since 1974 we have conducted an extensive research and monitoring program to determine the radiological conditions at the atolls, identify the critical radionuclides and pathways, estimate the radiological dose to current or resettling populations, and develop remedial measures to reduce the dose to atoll populations.

Seismic Discrimination of Recent Indian and Pakistani Nuclear Tests With Short-Period Amplitude Ratios

http://library.llnl.gov/BASIS/lof_ext/SDW?W%3DKW+PH+WORDS+%27nuclear+%27+AND+year+%3D+1999+ORDER+BY+EVERY+YEAR/Descend%26M%3D1%26R%3DY

Abstract: The recent Indian and Pakistani nuclear tests provide new calibration data for testing shortperiod seismic discrimination strategies. We measured amplitudes of regional and upper mantle phases for the tests and many earthquakes recorded at stations NIL (Nilore, Pakistan) and AAK (Ala Archa, Kyrgyzstan). For the Indian test recorded at NIL, phase ratios such as Pn/Lg and Pn/Sn show promise of discrimination even at relatively low frequencies (0.5-2 Hz). This observation differs from previous results which report poor separation of earthquakes and explosions at lower frequencies and better separation at higher frequencies. Spectral and cross spectral ratios show a strong distance and magnitude dependence that arises from source sizecorner frequency scaling and differential attenuation. We developed a simple procedure for modeling the distance and magnitude dependence of spectral ratios and applied it to the NIL data. Results show that the distance and magnitude corrections Improve the discrimination of the Indian test for the spectral and cross-spectral ratio data, Path propagation effects on regional phases (e.g. attenuation and crustal waveguide heterogeneity) result in lateral variations of discriminants beyond simple distance trends We show that accounting for path effects with Bayesian kriging can significantly improve discrimination performance. These correction procedures lead to more normally distributed discriminants for input into multivariate discrimination algorithms which we are using to further analyze the NIL data. The Indian and Pakistani tests and adjacent earthquakes were recorded at upper mantle distances at station AAK. These tests do riot discriminate well from nearby earthquakes when amplitudes are measured using standard procedures for regional data (<1500 km). At these distances P and S body-wave arrivals are composed of interfering upper mantle triplication arrivals. We are investigating strategies for improving discrimination in the upper mantle distance range.

Two-Station Phase Velocity Determination for Structure in North America

http://library.llnl.gov/BASIS/lof_ext/SDW?W%3DKW+PH+WORDS+%27treaty%27+AND+year+%3D+1999+ORDER+BY+EVERY+YEAR/Descend%26M%3D11%26R%3DY

Abstract: The seismic structure of North Africa is poorly understood due to the relative paucity of stations and seismicity when compared to other continental regions of the world. A better understanding of the velocity structure in this area will allow improved models of travel times and regional phase amplitudes. Such models will improve location and identification capability in this region, leading to more effective monitoring of the Comprehensive Nuclear-Test-Ban Treaty. Using regional-to-teleseismic Rayleigh and Love waves that traverse the area we can obtain information about the region's seismic structure by examining phase velocity as a function of period. We utilize earthquakes from the tectonically active regions bounding North Africa (Mediterranean, Red Sea, East African Rift, and Mid-Atlantic Ridge) recorded at broadband seismic stations distributed throughout the region. A two-station method is utilized to determine phase velocity information along the interstation segment of the ray path. The two-station method provides particular advantage in this region as it dramatically increases the number of events available to provide pure North African sampling.

Using Epicenter Location to Differentiate Events from Natural Background Seismicity

http://library.llnl.gov/BASIS/lof_ext/SDW?W%3DKW+PH+WORDS+%27nuclear+%27+AND+year+%3D+1999+ORDER+BY+EVERY+YEAR/Descend%26M%3D1%26R%3DY

Abstract: Efforts to more effectively monitor the Comprehensive Nuclear-Test-Ban Treaty (commonly referred to as the CTBT) include research into methods of seismic discrimination. The most common seismic discriminants exploit differences in seismic amplitude for differing source types. Amplitude discriminants are quite effective when wavepropagation (a.k.a. path) effects are properly accounted for. However, because path effects can be exceedingly complex, path calibration is often accomplished empirically by spatially interpolating amplitude characteristics for a set of calibration earthquakes with techniques like Bayesian kriging. As a result, amplitude discriminants can be highly effective when natural seismicity provides sufficient event coverage to characterize a region. However, amplitude discrimination can become less effective for events that are far from historical (path-calibration) events. It is intuitive that events occurring at a distance from historical seismicity patterns are inherently suspect. However, quantifying the degree to which a particular event is unexpected could be of great utility in CTBT monitoring.

DEPARTMENT OF STATE

ARMS CONTROL

Adherence To and Compliance With Arms Control Agreements

http://www.state.gov/www/global/arms/reports/annual/comp98.html

Abstract: This Report addresses U.S. compliance, compliance by Russia and other successor states to the former Soviet Union (FSU) to treaties and agreements concluded bilaterally with the Soviet Union, and compliance by other countries that are parties to multilateral agreements with the United States. The issues addressed reflect activities from January 1, 1998, through December 31, 1998, unless otherwise noted.

CHEMICAL AND BIOLOGICAL WARFARE

Weapons of Mass Destruction

http://www.state.gov/www/global/arms/bureau_np/wmd_np.html

Abstract: Weapons of mass destruction -- nuclear, biological, chemical -- and their delivery systems, pose a major threat to our security and that of our allies. A key part of our national security strategy is to seek to stem the proliferation of such weapons.

CONVENTIONAL ARMS CONTROL

Annual Reports on Military Expenditures

http://www.state.gov/www/global/arms/amiex.html

Abstract: These reports are submitted to the Committee on Appropriations of the U.S. Senate and the Committee on Appropriations of the U.S. House of Representatives by the Department of State in accordance with section 511(b) of the Foreign Operations, Export Financing, and Related Programs Appropriations Act, 1993.

Arms and Conflict in Africa

http://www.state.gov/www/global/arms/reports/arms_conflict.html

Abstract: Arms transfers and trafficking and the conflicts they feed are having a devastating impact on Sub-Saharan Africa. For the first time since 1989, Africa has more armed conflicts than any other continent.

Arms Flows to Central Africa/Great Lakes

http://www.state.gov/www/global/arms/bureau_pm/fs_9911_armsflows.html

Abstract: Arms trafficking to the Central Africa/Great Lakes region will continue unabated for the foreseeable future. Establishing strong monitoring and policing mechanisms throughout the world to support ongoing efforts to restrict arms flows to the region will require an unprecedented demonstration of sustained political will on the part of the regional and international leaders.

Defense Trade Controls

http://www.pmdtc.org/

Abstract: The Office of Defense Trade Controls (DTC), in accordance with sections 38-40 of the Arms Export Control Act (AECA) (22 U.S.C. 2778-80) and the International Traffic in Arms Regulations (ITAR)(22 C.F.R. Parts 120-130), controls the export and temporary import of defense articles and services by taking final action on license applications and other requests for approval for defense trade exports and retransfers, and handling matters related to defense trade compliance, enforcement and reporting.

Humanitarian Demining Program

http://www.state.gov/www/global/arms/pm/hdp/pubs.html

Abstract: The U.S. Government humanitarian demining program assists selected countries in relieving human suffering and in developing an indigenous demining capability while promoting U.S. interests. The program provides increased humanitarian demining assistance to countries suffering from the presence of landmines, which maim and kill innocents, obstruct emergency assistance activities, hamper economic development, and impede free movement of citizens.

Missile Technology Control Regime

http://www.state.gov/www/global/arms/np/mtcr/mtcr.html

Abstract: The Missile Technology Control Regime (MTCR) is an informal political arrangement formed in 1987 to control the proliferation of rocket and unmanned air vehicle systems capable of delivering weapons of mass destruction and their associated equipment and technology. The Regime's controls are applicable to such rocket and unmanned air vehicle systems as ballistic missiles, space launch vehicles, sounding rockets, unmanned air vehicles, cruise missiles, drones, and remotely piloted vehicles.

World Military Expenditures and Arms Transfers 1998

http://www.state.gov/www/global/arms/bureau_ac/wmeat98/wmeat98.html

Abstract: WMEAT (pronounced "we-meet") is issued annually to serve as a convenient reference on military expenditures, arms transfers, armed forces and related economic data for hundreds of countries over the past decade.

NUCLEAR PROLIFERATION

Patterns of Global Terrorism

http://www.state.gov/www/global/terrorism/1999report/1999index.html

Abstract: The U.S. Government continues its commitment to use all tools necessary--including international diplomacy, law enforcement, intelligence collection and sharing, and military force--to counter current terrorist threats and hold terrorists accountable for past actions. Our goal is to eliminate terrorist safehavens, dry up their sources of revenue, break up their cells, disrupt their movements, and criminalize their behavior.

NUCLEAR TESTING

Comprehensive Nuclear Test Ban Treaty

http://www.state.gov/www/global/arms/ctbtpage/ntbpage.html

Abstract: President Clinton**:** "I am very disappointed that the United States Senate voted not to ratify the Comprehensive Nuclear Test Ban Treaty. This agreement is critical to protecting the American people from the dangers of nuclear war. It is, therefore, well worth fighting for. And I assure you, the fight is far from over."

CTBT Event

http://www.state.gov/www/global/arms/speeches/other/ctbtstat.html

Abstract: The third anniversary of the signing of the CTBT, Comprehensive Test Ban Treaty, a Treaty which would ban the testing of any nuclear device around the world.

STRATEGIC ARMS CONTROL

Start Treaty Memorandum of Understanding Data for United States

http://www.state.gov/www/global/arms/starthtm/mou/usmoutoc.html

Abstract: Notification of updated data in the Memorandum of Understanding, after the expiration of each six-month period.

WHITE HOUSE

NUCLEAR TESTING

Banning Nuclear Testing: The Comprehensive Test Ban Treaty

http://www.whitehouse.gov/WH/New/html/CTBT/factsheet1.html

Abstract: More than 150 countries have signed the Treaty so far, agreeing to stop all nuclear explosive testing. The Nuclear Test Ban Treaty would constrain nuclear weapons development and also help prevent nuclear technologies from spreading to other countries.

Comprehensive Test Ban Treaty: Military Leaders, Scientists, Arms Control Experts and Editorials Urge Ratification

http://www.whitehouse.gov/WH/New/html/CTBT/ctbt5.html

Abstract: "For decades, the United States has led the world against proliferation. If the United States Senate votes this treaty down, it would be a signal that the United States now wants to lead the world away from the cause of nonproliferation."

Comprehensive Test Ban Treaty Safeguards

http://www.whitehouse.gov/WH/New/html/CTBT/safeguards.html

Abstract: When President Clinton announced U.S. support for a "zero yield" Comprehensive Test Ban Treaty (CTBT), the President established concrete, specific safeguards that define the conditions under which the United States can enter into a CTBT. These safeguards will strengthen our commitments in the areas of intelligence,

monitoring and verification, stockpile stewardship, maintenance of our nuclear laboratories, and test readiness.

U.S. MILITARY STRATEGY AND TECHNOLOGY

A National Security Strategy for a New Century

http://www.pub.whitehouse.gov/uri-res/I2R?urn:pdi://oma.eop.gov.us/2000/1/7/1.text.1

Abstract: Americans benefit when nations come together to deter aggression and terrorism, to resolve conflicts, to prevent the spread of dangerous weapons, to promote democracy and human rights, to open markets and create financial stability, to raise living standards, to protect the environment - to face challenges that no nation can meet alone. The United States remains the world's most powerful force for peace, prosperity and the universal values of democracy and freedom. Our nation's central challenge - and our responsibility - is to sustain that role by seizing the opportunities of this new global era for the benefit of our own people and people around the world.

Preserving America's Privacy and Security in the Next Century: A Strategy for America in Cyberspace

http://www.pub.whitehouse.gov/uri-res/I2R?urn:pdi://oma.eop.gov.us/1999/9/17/1.text.1

Abstract: America now faces a new time of pivotal change, enormous opportunity, and promise. This time, technology itself presents both an opportunity and a threat to global society increasingly dependent on, and connected by, advanced computing and communications. Continuing a balanced strategy that advances our national interests is the challenge of our day.